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Notes and Comments

Colour Users' Problems

THE Colour Users' Association, whose annual meeting was held at Manchester on July 26, has had many fights to protect its members' interests since it was established in 1919, and its progress has been by no means easy, but it has kept steadily before it the first object for which it was formed, namely, the safeguarding of the interests of all colour users, large and small. Its second object was to help towards the establishment on a sound basis of the dye-making industry in this country, and in his address to the members Sir Henry Sutcliffe Smith, the chairman, said it was undeniable that enormous progress had been achieved, and that the industry is now on a sound footing. At the same time, it must not be forgotten that the standard of progress is essentially international and that British colour users can remain strong only so long as they are able to maintain their position coincidently with the advances made by their foreign competitors.

Sir Henry feels it is unreasonable that to-day, when the wholesale commodity index figure is only five points higher than in 1913, the price of dyewares should be practically 100 per cent. higher than they were immediately before the war, and he made no apology for stressing once more the need for facilities for placing finished products on the market at the lowest possible price. In the opinion of the Association the Safeguarding of Industries Act has served its purpose and should be allowed to lapse. Under present conditions it is not sufficiently elastic in its application, and it is felt that the question of dutiable and non-dutiable articles in the schedules to the Act could be safely left in the hands of the Import Duties Advisory Committee. Sir Henry devoted a considerable part of his speech to a review of the serious delays experienced in connection with the removal of the 10 per cent. duty on intermediates used as dyestuffs, and mentioned that the adoption of the recommendation of the Import Duties Advisory Committee, that there should be set up a joint consultative committee composed of three makers and three users, seem likely to prove extremely useful. Through their collaboration both the dye-making and dye-using industries will benefit.

The British Colour Council

A WELL-MERITED tribute was paid by Sir Henry Sutcliffe Smith at the annual meeting of the Colour Users' Association to the work of the British Colour Council, whose objects and the excellence of the work it has accomplished merit a still further extension of the support so far accorded to it. The Council is conducted by men who give, voluntarily, wholly disinterested service for the benefit of the colour-using industries generally, and without any thought of financial gain to themselves they aim constantly at giving the best possible colour service. Not only has there been considerable extension during the past year of the contracts made with education authorities, but notable progress has been made in the matter of industrial contacts, which will have the effect of making available, not only in the textile trade but in every colour-using industry, the advantages of standardisation. In this way there is being built up a spirit of co-operation which will be of the utmost possible value to the colour fashion movement.

The Dictionary of Colour Standards is proving helpful as a work of reference. It is already in use, not only throughout the British Empire, but all over the world, with the result that British Colour Council standards are becoming accepted in ever-widening circles. The colour forecasts issued in advance for each season have been successful, and the special colours sponsored by various members of the Royal Family—"Marina Green," "Jubilee," and "Margaret Rose"—have been a feature of the past year and have surpassed the run of most ephemeral fashion colours. Sir Henry commended the Council to the attention of all the members of his Association, and urged that, if they have not already joined, they would find it advantageous to do so.

Road Tar

THE paper presented by Mr. Cone before the International Conference in Rome, summarised much British experience in this line of development. It is a happy thought on the part of producers of many articles of commerce to employ an expert to tell the world about their goods and to advise users as to their problems and difficulties. The difficult fight which British road tar producers have had to wage to get their product established against an imported and already popular article is well known. It is satisfactory to note that there has been of late further improvement in the quality of tar-macadam surfacing by the use of more uniform grading of the aggregate and of higher consistency tar. The modern tendency is to produce a more dense mixture by allowing less voids. Obviously the more the mineral aggregate per unit volume, the greater the strength provided the aggregate is properly held together. The voids in a uniformly-sized granite aggregate are within a close approximation, 50 per

cent. If these voids be filled by much smaller aggregate which would also be closely sized and would not add to the total bulk (because they fitted within the interstices) the porosity would be 25 per cent. only—and so on. Ultimately, from a theoretical point of view, a nearly solid mineral mass could be obtained, held together by mere films of tar. In practical work this ideal cannot be well approached, but clearly the rôle and mechanism of the tar as a binder must be fully understood to permit of further advances in the strength of the surfaces of roads that will withstand the modern heavy traffic. Why does tar " set " a road surface? Is it simple evaporation leaving behind hard pitch?

The Chemical Research Board has begun to investigate this question and has compared thin films of tar exposed for the same period in the dark and in sunlight respectively, and has found that although the tar exposed in sunlight became much more viscous, the loss in weight is generally less than that of the other. This seems to indicate that causes other than loss of oil, such as polymerisation and oxidation are involved. The suggestion that polymerisation takes place has been confirmed by a marked increase in the ratio of the benzene-insoluble to pyridine-insoluble material in the sun-exposed tar and the formation of an adherent benzene-insoluble material has been revealed by exposing to sunlight films of tar on glass followed by extraction with benzene; this residue appears to be derived from the petroleum-soluble constituents of tar. Incidentally it may be observed that this change is effected by sunlight through ordinary glass. A slow absorption of oxygen by tar in the dark has also been measured. Will it one day be possible to add to the tar substances that will promote this polymerisation reaction and so cause the cold tar to set very much more rapidly? In the same way will it be possible to accelerate certain reactions preferentially so that the resulting oxidised and polymerised tar will be a more satisfactory binder and will make the resulting surface still stronger? One of the great difficulties of the road engineer is to prevent his surface from dusting and so blowing away or being washed away by showers. Clearly there is much room for research upon this important subject; the science of road surfacing is to-day only in its infancy.

The Organisation of Industry

THE Federation of British Industries has had under consideration for some considerable time the measures that have been proposed for the control and organisation of industry, including Lord Melchett's Enabling Bill which was the subject of a discussion, reported in THE CHEMICAL AGE, at the annual dinner of the British Chemical Plant Manufacturers' Association. The object of this and similar proposals is, broadly, to impose the views of the majority upon a dissenting minority, not primarily by Parliamientary or Government action, but by machinery provided initially by legislation. It is well known that many trade agreements are rendered less satisfactory, or even unworkable, by a recalcitrant minority which obstinately stands outside and proceeds to undersell those who abide by the general desires of the trade. If trade agreements were made for the purpose of obtaining fancy prices, this attitude would not be merely understandable, but deserving of approbation; since the real purpose is to provide nothing beyond a fair price with reasonable profit and an equitable share in whatever work is going, the attitude of the minority is naturally resented by the majority—hence this and other enabling bills.

The Federation Committee, however, has come to the conclusion that there are few occasions when the voluntary association is unable to provide the necessary basis of co-operation in industry, but it is essential that voluntary association should be extended to cover a far larger range of industry than is the case at present. The F.B.I. deems itself fully able to act as the necessary focusing point, even though the previous statement is to some extent a confession of failure. The F.B.I. considers that compulsion of minorities is a principle to be adopted only as a last resort, and in that conclusion it will be supported by most industrialists, even though it still leaves unsolved the problem of how to work agreements that some of those who should participate use to their own selfish advantage. The F.B.I. attitude is based, not on any belief that the action suggested by the proposals examined is unnecessary, but because it fears that " undue extension of compulsory methods would endanger the freedom and thought and action which we enjoy to-day." Unquestionably, coercion of minorities is un-British, and British industry has grown up in an atmosphere of complete freedom of action. The only point upon which criticism might be based is to ask whether, in their desire to work out their salvation in their own way, our captains of industry always realise that conditions have changed within a couple of decades out of recognition. Other nations like to lay down arrangements and regulations to the last jot or tittle of the law; the British have always preferred a loosely-knit organisation which may appear illogical but which, by reason of its elastic structure, can meet the variety of conditions that enter into industrial life.

Central Agricultural Bibliography

Increase in Original Subscribers

CONSIDERABLE progress is being made in connection with the organisation of the Central Agricultural Bibliography, and the list of original subscribers is gradually growing. It already includes the names of many workers in practical research in agriculture and a number of leading industrial concerns which specialise in agricultural developments. The scheme is unique owing to its connection with the Science Museum Library, which contains the most important collection of literature on agricultural subjects and possesses a highly skilled scientific staff. It is hoped that the scheme will bring together in its support the numerous bodies engaged in the furtherance of agricultural developments in this country on the common ground of the dissemination of knowledge of what is being done in our leading industry, which is capitalised even to-day at £1,000,000,000. Under 7 per cent. of our population is engaged in agriculture against 47 per cent. in France and an estimated figure of 63 per cent. for the whole world.

With an increasing number of people passing through the agricultural colleges and institutes, which are growing in size and numbers, and which are supported by Government aid to the annual amount of £300,000, it is clear that many of the students will wish to follow up some line of practical research themselves, and in order that this work may be undertaken with advantage they must have a comprehensive and accurate source of information of what others have done before them.

Mr. W. P. Dreaper is hon. secretary *pro tem,* and, pending the formation of the general bibliography committee, offers of support and communications on the subject should be addressed to him at 27 Willow Road, London, N.W.3

The Colour Users' Association

THE annual general meeting of the Colour Users' Association was held on July 26, at Cromwell Buildings, Blackfriars Street, Manchester. Sir Henry Sutcliffe Smith presided. In proposing that the report of the Council of the Association be adopted, Sir Henry said the output of British-made dyestuffs had been remarkably consistent during the last two years, the production in 1934 being only some 20,000 lb. less than in 1933, when it showed a considerable advance compared with the previous year.

Many new dyestuffs, representing important additions to the range of dyestuffs available in this country, were placed on the market during the past year, and whilst these additions had not included any individual product which could be singled out as of outstanding importance, taken in the aggregate they represented progress which was not less satisfactory because it was gradual. At the same time, a great deal of technical investigation had been undertaken in connection with improved methods of application of dyewares. Imperial Chemical Industries, Ltd., was to be congratulated on its achievement in discovering a new method of wool dyeing, which had created great interest throughout the dyeing and finishing industry and embodied ideas which might ultimately prove to be of great assistance to the dyer.

Much of the work relating to the development of chemical products designed to assist in scouring, mercerising, dyeing and finishing, etc., such as detergents, and assistants for stripping, colour-fixing, softening, bleaching, and delustring, had proved of great value. It had been a year of distinct progress, and the British makers deserved the colour users' congratulations on the excellence of their products, the high technical skill they had shown in producing new colours, the promptness of their service, and the value of their much-appreciated advice.

Sir Henry Sutcliffe Smith, Chairman of the Colour Users' Association

The following table, furnished by the Board of Trade, showed clearly the progress that had been made in the British dyestuffs industry during the last decade :—

Year.	Lb.	Index Figure.	Year.	Lb.	Index Figure.
1913	9,114,134	100	1928	50,960,472	559
1922	23,832,967	261	1929	55,785,032	612
1923	33,100,719	363	1930	42,590,243	467
1924	33,242,704	365	1931	48,621,073	533
1925	32,693,402	359	1932	49,380,266	542
1926	30,297,000	332	1933	52,944,866	581
1927	39,551,756	434	1934	52,925,636	581

The large increase in the importation of acetate rayon dyes was a point of somewhat exceptional interest. "We were pioneers in this field, and for a number of years were supreme," said Sir Henry. "It is true that we are still making considerable advances coincident with the growing consumption of acetate rayon, and our production of these dyestuffs in 1934 represents an increase of 52 per cent. over the average production for the five years 1929/1933. At the same time, considering that the manufacture of these dyestuffs involves merely the development of the principles laid down in the patents and published investigations of British firms, it is difficult to see why the imported products should not have been introduced by our own manufacturers."

A very similar position obtained in the case of the highly important vat dyes, where the imports from the Continent had increased largely. In 1934 the weight of vat dyestuffs

Sir Henry Sutcliffe Smith's Review of the Year's Work

imported in this country from the Continent was 2,109,560 lb., compared with 1,662,707 lb. in 1933, and 1,124,971 lb. in 1929. These figures showed that the increase in 1934 was 26.8 per cent., as compared with 1933, and 87.5 per cent. as compared with 1929. It was in the category of vat dyes especially that the greatest advances in colour technology had occurred during the last ten years, and it was evident that the Continental producers were sending to this country ever-increasing quantities.

"When I addressed you last," continued Sir Henry, "I directed attention to the appreciable decrease in the exports of dyestuffs and intermediates as compared with the previous year, the weight having dropped nearly 16 per cent. and the value nearly 5 per cent. It is gratifying to find that this falling off was only temporary, the exports for 1934 showing a substantial increase, and the aggregate value being more than 16 per cent. higher than in 1933, with a tonnage increased by over 11 per cent."

The first meeting of the newly-constituted Dyestuffs Advisory Licensing Committee was held on July 27, 1934. Apart from its main function of advising the Board of Trade with respect to the granting or refusing of licences, many matters of general interest had been discussed, such as aniline oil prices, the price of benzol for use in the manufacture of dyeware, etc. Following a request made at the first meeting by the user members of the committee that in view of the confidential nature of the information, details of applications made by colour users for licences should be given under a number, without disclosure of the name of the applicant, it was agreed to adopt this course, thereby eliminating the possibility of any suggestion that by virtue of their position, colour user members of the committee were obtaining an unfair trading advantage. The following table gives a summary of the licences granted for the importation of dyestuffs and intermediates from 1921 to 1934.

Last year the applications for licences were dealt with just as expeditiously as in prevous years; approximately 97 per cent. were dealt with within four days of receipt, notwithstanding the fact that no fewer than 9,418 applications were received in 1934, as compared with 7,705 in 1933, and 5,479 in 1932. The number of applications received during 1934 showed an increase of 22 per cent., as compared with the number received during 1933. Of the 9,418 applications received, only 124 were refused. The average yearly importation for the years 1926 to 1934 has amounted to 5,460,650 lb. in weight, with a value of £1,165,529. Although the Licensnig Committee was empowered to recommend the granting of licences in cases where British dyemakers were not prepared to supply an equivalent product at an equal price, the committee found it necessary to exercise this power in only eight cases during 1934.

The year of office of Mr. Peter Caldwell, one of the representatives of the Colour Users' Association, on this committee, terminated on July 17, and the Board of Trade accepted the recommendation of the council that he should be re-elected.

The reconstituted Dyestuffs Industry Development Committee has held several meetings, and is tackling very energetically the problems set before it under its terms of reference.

Each member is desirous of doing his utmost to advance the interests of the British dyestuffs industry, and in visiting the works of various leading dyeware and chemical manufacturers of the kingdom, they have been greatly impressed with the very marked spirit of enterprise and progress which characterises these undertakings.

Dyeware Prices

"Although I have directed attention year after year to the unduly high prices of dyewares, both British and foreign, I am afraid that my representations have not so far met with much success," said Sir Henry. He felt that it is unreasonable that to-day, when the wholesale commodity index figure is only five points higher than in 1913, the prices of dyewares should be practically 100 per cent. higher than they were immediately before the war. In these difficult competitive days, complicated by the chaos of currencies, tariffs, quotas, and extreme nationalism, it is essential that we should have every facility for placing our finished productions on the market at the lowest possible price, and therefore he made no excuse for stressing once more the anomaly of the present prices of dyewares.

The licensing figures show that in spite of currency difficulties and the handicap of the Dyestuffs Prohibition Act, the Interessen-Gemeinschaft and the Swiss makers of dyewares have steadily improved their export position in relation to this country. This year's figures show a marked advance, which is a great tribute not only to their inventive genius, but to their foresight in anticipating the wants of colour users. It is a striking fact that during the last few years the Interessen-Gemeinschaft has placed on the market on an average one new dyestuff or dyeing auxiliary every second day, and the Swiss manufacturers have also shown remarkable achievements on similar lines. Sir Henry congratulated them on their enterprise and progress.

Safeguarding of Industries Act

As the Safeguarding of Industries Act is due to expire in August, 1936, the Board of Trade appointed Sir Geoffrey Ellis, Bart., M.P. (chairman), Brig.-Gen. Sir Harold Hartley, C.B.E., F.R.S., Mr. W. Renton Jones, and Sir Allan Powell, C.B.E., to be a committee to consider the position that will arise on the expiry of the Act, and to report whether, and how far, in the interests of Imperial defence, and having regard to the provisions of the Import Duties Act (a), the various duties now in force should be continued and if so at what rates of duty, and (b) duties should be imposed on articles not coming within the scope of the present duties, and if so at what rates of duty. This Key Industries Committee commenced its work early in May and asked that representations which consumers of articles chargeable with Key Industry Duty desired to make relative to the duties, should be submitted to the Secretary not later than May 23. The number of articles coming under the ægis of the Act was considerable, and whilst the bulk consists of fine chemicals or pharmaceutical products, there was quite a number of commercial commodities used in the dyeing, printing and finishing industries.

The Colour Users' Association was asked to place its views before the committee, and on the recommendation of the Vigilance Committee, who felt that the present method was not flexible enough and did not give sufficient latitude for variation, the following resolution was sent to the committee by the Association:—"In view of the fact that the manufacturers have had 15 years under the Safeguarding of Industries Act, 1921, in which to establish themselves, the time has arrived at which they should be sufficiently self-supporting under the 10 per cent. general *ad valorem* duty imposed by the Import Duties Act, 1932, and that the Safeguarding of Industries Act, 1921, should be allowed to lapse. In these circumstances any manufacturers claiming this preference to be insufficient would have the opportunity of proving their case before the Import Duties Advisory Committee."

"Personally," said Sir Henry, "I feel that the Safeguarding of Industries Act has served its purpose, and that under to-day's conditions it is not sufficiently elastic in its application. In my view, the question of dutiable and non-dutiable articles in the schedules to the Act could be safely left in the hands of the Import Duties Advisory Committee."

Import Duty on Intermediates

When Sir Henry last addressed the Colour Users' Association negotiations were proceeding with a view to the removal of the 10 per cent. Import Duty on Intermediates used as dyestuffs. The Association had been informed that if they could agree upon a recommendation they might expect that it would have the support of the Import Duties Advisory Committee. Accordingly, the Joint Consultative Committee of Makers and Users, who had been asked by Sir Allan Powell to try to hammer out an agreed definition of the imports to be exempted from duty, met on July 27 of last year and unanimously agreed to put forward the following recommendation:—"That there should be added to the Free List all synthetic organic intermediate products not made in this country which are used by textile dyers and printers for the production of dyestuffs on the fibre, provided that in considering an application for the import of intermediates made in this country on price grounds the Licensing Committee shall not issue a licence on price grounds if the British makers' price is not more than 10 per cent. above the foreign price. The Joint Technical Committee shall prepare a list of non-contentious materials used by textile dyers and printers for the production of dyestuffs on the fibre, which the dye makers shall agree to recommend to the Advisory Committee for addition to the Free List."

The Joint Technical Committee, which met in Manchester on July 31, 1934, found that they could not arrive at an agreed list owing to certain fundamental objections from the makers' side. This was followed by an emergency meeting of Group IX of the Association of British Chemical Manufacturers held in London on August 24, 1934, when confidence was expressed in the makers' representatives on the Joint Technical Committee, who were again authorised to assist in the compilation of a list of intermediates which the Joint Consultative Committee of Makers and Users could recommend for addition to the Free List.

Intermediates on the Free List

On September 18, 1934, at a meeting in Manchester, the Joint Technical Committee agreed upon a list, which was signed by Major L. B. Holliday for the makers, and by Sir Henry Sutcliffe Smith for the users, and sent to the Import Duties Advisory Committee with formal application for the inclusion in the Free List of the items detailed. On November, 1934, the Import Duties Advisory Committee intimated that on their recommendation the Treasury had made an Order adding to the Free List the intermediate products used in the production of dyestuffs on the fibre, as recommended

DYESTUFF LICENCES GRANTED.

Year.	For importation from Germany.		For importation from Switzerland.		For importation from other sources.		Total.	
	lb.	Value. £	lb.	Value. £	lb.	Value. £	lb.	Value. £
1921	671,032	197,466	1,796,754	763,299	209,719	82,056	2,677,505	1,042,821
1922	1,325,671	375,675	1,638,235	694,740	270,987	33,404	3,234,893	1,103,819
1923	1,817,571	493,499	1,412,616	459,861	461,253	36,177	3,691,440	989,537
1924	1,805,145	398,226	1,191,931	363,513	39,158	9,204	3,036,234	770,943
1925	2,175,262	334,749	1,157,270	307,754	66,522	9,081	3,399,054	651,584
1926	2,949,858	599,157	1,190,951	333,448	91,778	11,402	4,232,587	944,007
1927	3,644,152	710,938	1,230,815	306,595	115,389	16,480	4,990,356	1,034,013
1928	3,534,935	729,393	1,373,226	335,226	122,350	9,494	5,030,511	1,074,113
1929	3,899,412	743,951	1,787,796	402,788	127,069	11,385	5,814,277	1,158,124
1930	3,774,882	712,946	1,506,996	360,252	248,605	14,331	5,530,483	1,087,529
1931	4,123,153	837,960	2,191,109	519,909	158,641	14,259	6,472,903	1,372,128
1932	3,542,175	668,840	1,270,164	393,031	293,950	23,078	5,106,289	1,084,949
1933	3,607,648	732,459	1,558,914	439,180	279,481	18,394	5,446,043	1,190,033
1934	4,392,689	981,222	1,750,069	538,679	379,640	24,967	6,522,398	1,544,868

by the Joint Consultative Committee, totalling 122 items. This was confirmed by White Paper Cmd. 4747, giving a full list of the items exempted from duty, and the Order became effective on November 29, 1934.

After the addition to the Free List of these various intermediates, some uncertainty was felt as to the proceduree in regard to any new products which the colour users might desire subsequently to have added to the list. It was agreed that the arrangements should be such as to avoid unnecessary delay in making these additions. At that time the procedure was that the Colour Users' Association on receipt of an intimation that a foreign dyeware maker desired to bring in some additional intermediate product, referred the matter for consideration to the Joint Consultative Committee: this committee then referred the application to the Joint Technical Committee, and on receipt of a unanimous recommendation from that committee, requested the Import Duties Advisory Committee to recommend that the addition should be made. The Import Duties Advisory Committee, if in agreement, then recommended the Treasury to make the necessary order.

On December 20, 1934, a letter was received by the Secretary of the Colour Users' Association from I. G. Dyestuffs, Ltd., Manchester, stating that they had several new products, and some more soluble and concentrated forms of products already exempted, which they wished to have added to the Free List. They did not intend to import these products until they were put on the Free List, and they suggested that a test case might be made of these particular items and an effort made to obtain some simplification of the procedure.

A Non-Unwieldy Free List

On February 5, 1935, the Clayton Aniline Co., Ltd., on behalf of the Society of Chemical Industry, Basle, wrote to the Colour Users' Association, asking that application should be made for a number of naphthols, bases and salts to be put on the Free List. Some of these products, however, were identical in chemical composition with products manufactured by the Sandoz and Geigy people, although sold under different names. When these applications were considered by the Joint Technical Committee on March 1, 1935, the User Representatives were of opinion that it would be better if the three Swiss firms—the Society of Chemical Industry, Sandoz and Geigy—would agree to apply for the free entry of their naphthols, colour bases and colour salts under one generic name in cases where the products were similar, as this would tend to prevent the Free List from becoming unwieldy and avoid creating a wrong impression.

Accordingly, a letter recommending this procedure was sent to each of the three Swiss firms on March 6, 1935, to which a reply was received on March 18 from the Society of Chemical Industry, Basle, stating that after conferring with the Sandoz and Geigy concerns they had come to the conclusion that it would be better that they should have their products shown on the Free List under the different names rather than that they should adopt the Association's suggestion. The Joint Technical Committee held a meeting on March 19, 1935, and then agreed that after submission to the makers' and users' representatives on the Joint Consultative Committee, the list should be transmitted by the latter to the Import Duties Advisory Committee as an agreed list of intermediate products not made in this country. This course was followed, the list being signed by Major Holliday and Sir Henry Sutcliffe Smith and sent to the Import Duties Advisory Committee with a formal application on April 10, 1935.

Trade Names v. Chemical Descriptions

The Import Duties Advisory Committee and H.M. Customs were of opinion that the use of trade names instead of chemical descriptions was not satisfactory as a means of defining products on a list exempting them from duty, and that it was undesirable to have on the exempted list three or more names for one and the same product, and a good deal of delay would have been avoided if the Swiss makers had seen their way to accept the advice given by this Association in the first instance. Mr. N. G. McCulloch, Mr. C. M. Whittaker, and Sir Henry Sutcliffe Smith discussed the whole position with Sir Percy Ashley in London on June 13 last, when Sir Percy agreed to meet representatives of the Swiss makers. This he did on June 20, and it was then agreed that chemically-identical products would be imported under a single name, the use of proprietary names being confined to marketing the intermediates after importation. An amended schedule, based on this arrangement, was considered and approved by the Joint Technical Committee on July 5 last, and has been made the basis of a new application to the Import Duties Advisory Committee. This application was dated July 18, and there is every hope that a speedy and satisfactory decision will be reached.

The difficulties and delays which have been and are being experienced in getting additions made to the Free List in the case of new intermediate products were fully anticipated by the Colour Users' Association. The Association strongly advised last year that these particular wares should be dealt with on general lines rather than specifically, and they consider that if their suggestion had been followed it would have obviated the serious delays which have been experienced.

Interests of the Colour Users

Mr. N. G. McCULLOCH, in seconding the resolution, said the importance of the Association and the services rendered by its representatives in looking after the interests of colour users were impressed upon his mind when he observed the increasing number of licences granted for the importation of dyestuffs. Colour users should be able to avail themselves of the services of the makers of foreign dyestuffs to the greatest possible extent. Then the drawing to a close of the Safeguarding of Industries Act laid upon the Association the duty of looking after the interests of the members so far as the materials they previously used under that Act were concerned. With regard to intermediates it was extremely unfortunate that it had taken so long to have those articles placed on the free list, more than twelve months after it was agreed that should be done. One wondered whether the Association was in a position to exercise the influence and pressure which the interests of the members demanded; the impression was given that the interests of the dyemakers received greater attention than the interests of the colour users.

Mr. PETER CALDWELL, supporting the resolution, said the chairman had referred to the marked progress made by the I.G. and the Swiss makers of dyewares. He mentioned that during the last few years the I.G. had placed on the market on an average one new dyestuff or dyeing auxiliary every second day. In this country there was nothing like that. At present they had to look to foreign makers for colours that would be fast to sand and seawater; but they hoped to see progress made in this country in that direction.

The resolution was adopted unanimously.

Mr. F. O. Ashmore was co-opted a member of the Council on the motion of Mr. C. M. Whittaker, seconded by Mr. G. E. Holden.

Election of Council for 1935-36

It was announced that the Council had been appointed as follows to hold office until April 30, 1936. Elected by amalgamated companies: Bleachers' Association, Ltd., E. Carr Deakin; Bradford Dyers' Association, Ltd., Sir Henry Sutcliffe Smith, Harry Martindale; British Cotton and Wool Dyers' Association, Ltd., C. Rawson, P. Caldwell, E. T. Holdsworth; The Calico Printers' Association, Ltd., Forrest Hewitt, W. E. Kay, N. G. McCulloch; J. and P. Coats, Ltd., E. L. B. Lart; The English Sewing Cotton Co., Ltd., Peter Erman; The English Velvet and Cord Dyers' Association, Ltd., G. E. Holden; The Leeds and District Worsted Dyers' and Finishers Association, Ltd., C. W. Wade; Smith, Stone and Knight, Ltd., T. Parker Smith; F. Steiner and Co., Ltd., Harold Fothergill; United Turkey Red Co., Ltd., J. F. Christie; Wallpaper Manufacturers, Ltd., Osmund Smith; Yorkshire Indigo, Scarlet and Colour Dyers, Ltd., George Hodgson. Elected by trade groups: Calico printing, Arthur Clayton, E. Drew, W. L. Dixon; wool dyeing, Henry Blackburn, George Garnett, C. M. Whittaker; cotton dyeing, W. W. L. Lishman; silk dyeing, Gilbert Tatton; garment dyeing, H. L. Mitchell.

Bayley Wood, Cave and Co., auditors, were re-elected on the motion of Mr. W. L. Lishman, seconded by Mr. E. T. Holdsworth.

A vote of thanks to the chairman, proposed by Mr. E. Carr Deakin, seconded by Mr. T. Parker Smith, concluded the proceedings.

Polymerised Tung Oil

Thermal Measurement and Linseed Oil Dilution

MUCH of the recent work on tung oil has been directed to a study of its heat polymerisation, both undiluted and also diluted with varying proportions of linseed oil or other diluents, with a view to the production of mixed stand oils and more particularly mixed linseed-tung stand oils. Fonrobert and his co-workers ("Farben. Zeit.," 1935, *40*, 477, 505, 533, 560, 586) have published the results of some interesting research, by means of thermal measurements, on the polymerisation of tung oil, with and without admixture of linseed oil, which throw some additional light on the complexity of the chemical reactions taking place. These reactions are exothermic and produce heat whereby the rate of reaction may be measured. This reaction rate varies with temperature and degree of dilution of the tung oil in the linseed tung oil mixtures.

The apparatus used consisted essentially of a Jena beaker of 200 c.c. capacity, a small cylindrical immersion heater, a mechanical stirrer, two thermometers registering up to 360°, and a cylindrical cardboard container in which the beaker is stood on cork supports with a clearance of about 1 cm. all round. The beaker is filled with 170 g. of the oil or mixture under test and the thermometers and stirrer are so supported that one of the former has its bulb in the heater and the other is somewhat above the heater, whilst the stirrer is near the bottom and below the heater. This latter is supplied with an amperemeter and sliding resistance. Temperatures were read on both thermometers every 15 seconds. This arrangement served the purpose very well, although additional refinements might consist in better heat insulation, more exact electrical measurements, etc.

The first series of curves given by the author shows the temperature-time relation, the steep and rapid heating and the much more gradual cooling, and, what is of particular interest, the difference between the cooling of tung oil and of linseed oil and in the extent to which they both continue momentarily to increase in temperature after the current has been switched off.

This increase is much more marked with tung oil than with linseed oil and cannot be attributed merely to an after-jump by the thermometer. It is provisionally concluded from these preliminary tests with tung oil, and with linseed oil separately, that polymerisation and gelling in tung oil continues, at least for a short time, even after the mass has become practically solid; also, that the thickening of the tung oil by polymerisation is exothermic and produces heat.

Bi-molecular Polymerisation

The next series of curves show the heating rate (temperature increase per minute) and temperature curves, those for linseed oil being perfectly linear, whilst the tung oil are linear below 225-250°, but above that temperature the heating velocity increases instead of showing a uniform and continuous decline like linseed oil. These curves are given for tung oil and linseed oil separately and also for tung oil diluted with varying proportions of linseed oil, paraffin or salad oil. It is found that polymerisation of a tung oil linseed oil mixture is not mainly bi-molecular but largely mono-molecular; and the same applies when the tung oil is diluted with weakly-reacting diluent such as salad oil. In regard to the question whether the heat of reaction may be due to a steric conversion of the α-elæostearic acid, the heat of polymerisation being only of secondary importance, this suggestion is negatived for various reasons. Not only did Rossman, for example, find that the alpha acid is converted into the beta acid within a few minutes at 250°, but in the present work it was found that the evolution of heat increased with rising temperature even when, as in later experiments, the oil or oil mixture was heated twice up to 320°. Among the structural changes taking place in heat polymerisation is the disappearance of the double bonds, and there is certainly much less energy set free and consequent heat production in a steric change than in the elimination of the double bonds.

It may appear, of course, rather strange that such a marked increase in viscosity should take place in a mono-molecular reaction, and in explanation thereof it may be observed firstly that the reaction is not said to be wholly mono-molecular: there is a certain amount of bi-molecular action as well; and, secondly, inter-esterification also takes place. This is not thermally indicated so that the dicarboxyl and probably also the polycarboxyl acids may continue to form larger molecules by inter-esterification.

Since the production of heat is considered of fundamental significance in the whole process of thickening, it is further pointed out this thickening in stand oil manufacture depends for the most part on two closely-related reactions, those of polymerisation and inter-esterification. In the first place two fatty acid radicles in the same glyceride combine through their double bonds, forming dicarboxyls, and then inter-esterification takes place with other glycerides, so that the dicarboxyls are now united with two glyceride radicles, thus naturally doubling the molecular weight. In this way not only tri- but polycarboxyls may be formed leading to still larger molecular complexes. These polymerising and esterifying reactions are of considerable interest and importance, and show that the quality of a stand oil depends primarily on the temperature used. Wolff and Zeidler had previously found that a linseed stand oil obtained at 240° had an iodine value of about 120, but if prepared at 300° with the same viscosity it now had an iodine value of 160. With further heating and much greater viscosities differences in iodine values of 55 were obtained, the viscosities being the same. Wolff had attributed this to "association" (inter-esterification) which was accelerated to a greater extent at the higher temperatures than polymerisation.

Dilution with Linseed Oil

If tung oil is diluted with linseed oil it is found that when the mixture is heat polymerised the two oils do not individually and separately undergo the various changes which occur, but that the linseed oil takes part in the polymerisation of the tung oil to a degree depending on the temperature and on a percentage of linseed oil present. This participation is the greater the higher the temperature and the lower the tung oil content of the mixture. At low temperatures, however, the linseed oil has a retarding effect on the polymerisation of the tung oil. It is further found that the extent of the linseed oil share in the reaction is increased by the presence of oxygen.

Two further points remain, namely, the optimum percentage of tung oil in the linseed-tung oil mixture, and the temperature range. In regard to the first, the results of the present work show that the proportion of tung oil should not exceed 25 per cent., as this is the figure usually adopted in practice. It is important to note, however, that the polymerised product is not linseed stand oil nor tung stand oil, but a mixed polymerisate with characteristic properties of its own differing from those of the individual stand oils. In this connection it is suggested that new types of stand oil could probably be obtained by heating linseed oil rapidly to 300-310°, then with vigorous stirring spraying in tung oil at that temperature, and further heating to the desired consistency. Alternatively, a linseed-tung oil mixture could be heated to about 150° with addition of about 0.05 per cent. lime till maximum inter-esterification had taken place, and then rapidly heating up to 300-310°. It is indeed obvious that by heating up varying mixtures of linseed oil and tung oil, or tung oil with other diluents, under varying conditions, a wide field of research is opened up; and, as a matter of fact, this field is now being thoroughly explored by many workers in the paint and allied industries.

Temperature Range in Polymerisation

The temperature range is undoubtedly a matter of primary importance. The fact that higher temperatures are required in order that linseed oil may take an appreciable part in the polymerisation of tung oil is strong evidence in support of the contention that the quality of tung oil stand oil is markedly affected if the temperature exceeds 270°. In the absence of air the participation of linseed oil in the reaction is not appreciable until a temperature of 275° has been reached. Both the present work and that of previous investigators shows that the critical temperature range for tung oil polymerisation is 270-280°, and the same applies to mixtures of tung oil and linseed oil.

Industrial Spectrum Analysis—III.

By C. S. Hitchen, Ph.D., A.R.C.Sc., and C. J. D. Gair, O.B.E., F.C.S.

HAVING considered the instrumental side of industrial spectrum analysis it is necessary now to deal with the methods themselves. It will be realised, however, that the subject is so extensive that adequate consideration in a short series of articles is out of the question; all that can be done is to select two or three of the most direct for examination. It is hoped that the remarks offered will stimulate interest and a perusal of the current literature.

Hartley's Method. As a result of his pioneer researches on the spark spectra of metallic salts in solution, Hartley discovered that the lines in the spectrum of an element *progressively* disappear when its concentration diminishes. He then proceeded to tabulate the principal lines, and the concentrations at which they disappear, and thus initiated a method of approximate quantitative analysis which was subsequently developed and extended by Pollock and Leonard. A full account of the work will be found, together with tables and original references, in F. Twyman and D. M. Smith's "Wavelength Tables for Spectrum Analysis."

Comparison Method. A number of spectrograms are prepared from a series of carefully analysed standard samples containing the impurity in known amounts and covering the desired range of percentage. The spectrograms are preserved and referred to when analyses of "unknown" samples are made, comparison being effected as regards number and intensity of the lines due to the impurity under estimation. It is, of course, essential that all experimental conditions are rigorously standardised. This procedure includes Hartley's method and extends it so that change in intensity serves as an analytical criterion. Originally developed by A de Gramont, it has been greatly improved by subsequent workers, some of whom have employed it with considerable success in the field of metallurgical spectroscopy. By means of the comparison method it is usually possible to distinguish between 1.0, 0.10, 0.01 and 0.001 per cent. of a given impurity, and under favourable conditions intermediate percentages may be inferred. Although still used in industry, the more modern methods are tending to supersede it.

Mechanism of Internal Standard Method

Internal Standard Method. It has already been emphasised that, while the success of quantitative spectrum analysis depends upon a rigorously controlled experimental procedure, there are certain factors, notably electrical discharge conditions, which *cannot* be controlled beyond a certain degree. About ten years ago it became apparent that if quantitative spectrography were to continue its advance means would have to be devised either of adequately controlling these electrical discharge conditions or of eliminating their effects altogether. Fortunately a solution to the problem was furnished by W. Gerlach who introduced the Internal Standard method whereby the intensities of the lines due to a minor constituent of the sample were matched with lines of the main constituent, or, if required, of an added substance acting as main constituent.

The mechanism of this method is as follows: Assume the case of a series of similar samples in which it is desired to estimate spectroscopically the concentration of a minor

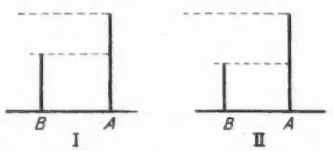

Fig. 9.—Intensities are indicated by the length of the lines, A=main constituent, B=minor constituent.

elementary constituent. In diagram (I) (Fig. 9), A is a line due to the main constituent, or to an element occurring in the samples of a fairly constant amount, while B is a line due to the minor constituent element which we desire to estimate. It has been stated that when the main constituent is present in large excess, small variations in its concentration cause no perceptible change in line intensity, and any variation which does occur will probably be due solely to electrical conditions. Now the line B is affected both by concentration and discharge conditions, while A is affected by discharge conditions alone. By measuring the intensity of the line B in relation to that of A it is therefore possible to *eliminate* the effect of electrical conditions on the intensity of B. In diagram (I) the intensity of the line B is half that of A, while in diagram (II) electrical conditions have been weaker and A has decreased in intensity. However, these conditions have likewise affected B, and therefore the intensity of the latter is still half that of A.

In the above explanation it has been assumed that the electrical conditions have affected both the lines equally so that there has been no change in *relative intensity*. The researches of Schweitzer have shown, however, that, of various line pairs which may be selected (one of the standard and the other of the element under estimation), the relative intensities are affected by discharge conditions in greater or lesser degree, while those of other pairs remain practically unaffected. The latter are obviously to be recommended in preference to all others, and are termed *homologous pairs* Such, however, are often few in number, and it has been found possible to employ successfully line pairs whose relative intensities are only affected in lesser degree by carefully controlled discharge conditions. For further information on this rather involved subject the reader is referred to Gerlach and Schweitzer's "Foundations and Methods of Chemical Analysis by the Emission Spectrum."

Absorption Effects

In addition to the foregoing it is necessary to consider the possibility under certain conditions of absorption effects on the lines. Radiation emitted from the luminous portion of the arc or spark is liable to undergo selective absorption in passing through the cloud of vapour which always envelops them. This cloud consists of the substance of the electrodes. Since every atomic state absorbs radiation which is emitted during the transition of the atom from state to state, it generally follows that lines suffering greatest absorption in the vapour cloud will be "Raies Ultimes" of the main constituent. Absorption may be so great as to cause "reversal," this being particularly noticeable in the case of the two lines of copper, 3,273 A and 3,247 A. In regard to the minor constituents, the absorption effect does not interfere because only small quantities are involved. "Raies Ultimes" and sensitive lines of the main constituent should be avoided as internal standards.

As an example of the Internal Standard method of working consider two alloys of lead and tin. In one, the tin amounts to 0.25 per cent. and in the other 0.5 per cent. Let the spectra of these be photographed under identical conditions of slit width, exposure, etc., and then examined for the intensity of "homologous" lines. A suitable "homologous pair" consists of λ 2,411.9 for lead and λ 2,421.7 A for tin. These are situated conveniently close together. If it is found, as it should be, that the lead line above referred to is equal in intensity in both spectrograms then the *relative* intensity of the tin lines to each other is a measure of the percentages of tin in the two samples.

Now consider the utilisation of this. Let there be three samples of tin-lead alloys—A, B and C. A is the sample with an unknown tin content, B consists of tin 0.15 per cent. and lead 99.85 per cent., while C consists of tin 0.10 per cent. and lead 99.9 per cent. Spectrograms are taken of each as before and examined. It is found that in each case the lead line 2,411.9 A is equally intense, but only in A and C is the tin line 2,421.7 A equally intense. It is obvious therefore that the sample contains 0.10 per cent. tin. Upon such observations the Internal Standard method of Gerlach and Schweitzer is based. In their book, previously referred to, the method is called the "Absolute method of homologous pairs of lines." In this particular it should be noted that in estimating the amount of a minor constituent the lines which are useful

for intensity comparisons often change with concentration, and by the choice of a suitable series of lines it is possible to cover a wide range. In connection with the above, a paper by Brownsdon and Van Someren entitled "Application of the Spectrograph, Etc." (Journal of the Institute of Metals, XLVI, No. 2, 1931), may be consulted with advantage. See also "Control of Spectroscopy," by Dreblow and Harvey ("Industrial and Engineering Chemistry," page 823, July, 1933).

It may be asked what is to be done if the particular lead line is not found equal in the several spectrograms. Under these circumstances further spectrograms are taken until satisfactory results are obtained in this respect. The final question remains as to the determination of equality of the spectral lines selected. Accuracy to within ±10 per cent. can be obtained by direct visual comparison with a low power magnifier, but for more exact determinations the microphotometer must be employed. Research work is in active progress concerning this important question, and already an accuracy of ±2 per cent. is obtainable in favourable cases.

Logarithmic Wedge Sector Method

The Logarithmic Wedge Sector method is another way of applying the internal standard principle, and with it an accuracy of ±10 per cent., or in some cases ±5 per cent., can be reached withhout difficulty. It has been elaborated from a method of photometry devised by Mees in which wedges of neutral tint glass were inserted immediately in front of the slit of the spectrograph. With such wedges the time of exposure is the same for every point along the slit length, but the intensity of light varies logarithmically from point to point. In attempting to apply this scheme to quantitative spectrography Scheibe and Neuhäusser substituted a rotating sector, of the kind originally used by Holst and Hamburger in 1915, for the neutral tint wedge and

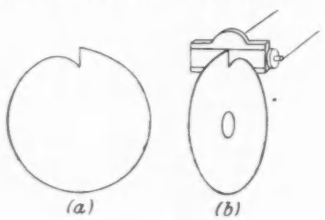

Fig. 10.

employed intermittent exposure. This system was later modified and developed by Twyman and Simeon, whose recommendations are usually followed at the present time. Although due credit must be given to Scheibe and Neuhäusser for their work, it should not be forgotten that Thorne Baker, in 1925 used a "Belin" sector (*viz.*, a stepped logarithmic sector) in front of the slit of the spectrograph as a means of quantitative spectrum analysis.

The essential feature of the method is a suitably cut sector used in conjunction with the apparatus normally employed in spectrographic analysis, namely, a spark stand, a quartz spherical condensing lens and a quartz spectrograph. The sector itself is illustrated in Fig. 10a and consists of a metal disc, the periphery of which is cut to conform with the equation

$$-\log \Theta = 0.3 + 0.2l,$$

where Θ represents the circumferential aperture expressed as a fraction of a complete circle at distance l measured radially inwards from the outermost part of the curve, while 0.3 and 0.2 are constants found in practice to give a convenient sector. The disc is mounted on the spindle of an electric motor, capable of rotating at a speed of approximately 350 revolutions per minute, and is placed directly in front of the slit as shown in Fig. 10b. Reference to this diagram will show that upon rotation of the sector, exposure will vary exponentially along the length of the slit, the extreme upper portion receiving light for half a revolution, while the lower portion will scarcely be exposed at all. The effect of this will be to produce pointed lines of various lengths. The lengths are a function of the several intensities. Actually the *difference* in the lengths of two closely neighbouring lines is proportional to the logarithm of the ratio of their intensities, and is correlated with the percentages of minor constituents present. In the use of the sector, one compares the lengths of a line of a minor constituent with that of a major constituent, being careful to select "homologous" lines spaced as close together as possible. For tin-lead alloys a suitable choice would be those referred to under the Internal Standard method.

Actual measurement of length can be made by a magnifier provided with a 20 mm. scale divided into tenths of a milli-

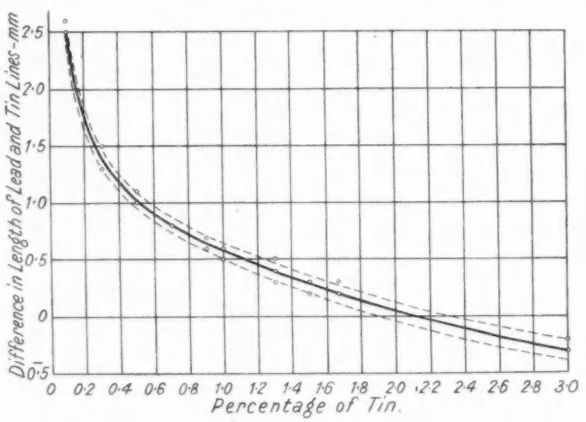

Fig. 11.—Differences in length between tin and lead lines plotted against percentages of tin in ten samples containing 0.1 per cent. to 3.0 per cent.

meter, and having a magnification of 12. More refined methods leading to greater accuracy may be employed, but the current literature should be consulted for these. Usually some initial difficulty is experienced in locating the termina-

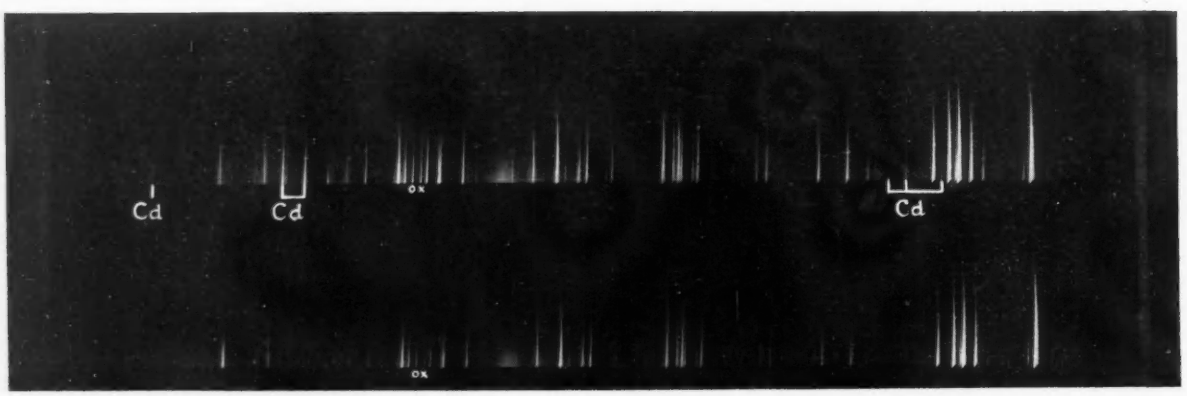

Fig. 12.—Logarithmic Sector Method. The tin and lead lines used for the quantitative determination of tin are indicated thus: O=2,411.9 A lead, and X=2,421.7 tin. The top spectrum is of an alloy containing 3.0 per cent. tin, and the one underneath of an alloy containing 1.0 per cent. of tin. These are sufficient to indicate the kind of spectra obtainable with the Logarithmic Wedge Sector.

tion of the lines, but after a little practice concordant results can be obtained to an accuracy of about ±5 per cent.

This is certainly a most promising method; the technique is straightforward, rapid and easily acquired. It has already been applied to the examination of steels, non-ferrous alloys, tin, zinc and various solutions. It appears to be applicable to a very wide range of industrial products.

The Determination of Tin in Lead by the Logarithmic Section Method.

% Sn.	Lengths of Lines. ∝ Sn 2421.7 A.	∝ Pb 2411.9 A.	Differences.	Mean.	% Sn.	Lengths of Lines. y Sn 2421.7 A.	y Pb 2411.9 A.	Differences.	Mean.
	4.6	4.4	—0.2			3.6	4.2	0.6	
3.0	4.8	4.5	—0.3	—0.3	0.9	3.8	4.5	0.7	0.6
	4.9	4.6	—0.3			4.0	4.6	0.6	
	4.7	5.0	+0.3			3.5	4.3	0.8	
1.7	4.4	4.6	0.2	+0.2	0.7	3.4	4.2	0.8	0.8
	4.9	5.1	0.2			3.9	4.7	0.8	
	3.8	4.1	0.3			3.1	4.1	1.0	
1.5	4.5	4.7	0.2	0.3	0.5	3.9	5.0	1.1	1.0
	3.6	3.9	0.3			3.2	4.2	1.0	
	4.6	5.1	0.5			3.0	4.5	1.5	
1.3	4.3	4.7	0.4	0.4	0.3	2.9	4.2	1.3	1.4
	4.7	5.0	0.3			3.1	4.6	1.5	
	4.1	4.7	0.6			2.4	4.9	2.5	
1.0	4.6	5.1	0.5	0.6	0.1	2.7	5.3	2.6	2.5
	5.0	5.6	0.6			2.7	5.2	2.5	

Figs. 11 and 12, and the table which appears above, show clearly the method of procedure and require little comment. They are each reproduced by permission from D. M. Smith's "Metallurgical Analysis by the Spectrograph" (Research Monograph No. 2 British Non-Ferrous Metals Research Association). In the graph, differences in length between the selected "homologous" tin and lead lines are plotted against percentages of tin in 10 samples containing 0.1 per cent. to 3.0 per cent. of this element. The value of such a graph in routine work is obvious. The relatively small variation in the length of the lead line throughout the run will be noted in the table.

No account of the technicalities of quantitative spectrum analysis would be complete without reference to the photographic part of the procedure. The actual choice of plates will depend upon the particular problem involved, the region of the spectrum photographed and the means employed for evaluating spectrograms. For general purposes, any reliable brand will suffice for photography in the blue-violet and ultra-violet regions. Plates should be of reasonably fine grain and medium speed, and possess "clean-working" properties. Where it is necessary to record both the visible and ultra-violet regions panchromatic plates may be employed. As the name implies, these are sensitive to all colours, but in practice few if any are uniformly sensitive throughout the whole spectrum range.

Details of the most suitable developer are usually notified by the makers. Where a choice exists, preference should be given to that which is less chemically vigorous. The loss of contrast is balanced by sharper boundaries to the lines and lesser tendency to show "grain"—factors which are of value in both visual and photometric examinations.

It is well to carry out the actual process of development on a standard "time-temperature" basis, and the developer should be kept in constant and even motion over the plate. Devices have been introduced for standardising development. These are, however, costly and their employment does not appear to be warranted. Fixing is a standard operation and requires no comment.

To sum up spectrum analysis should serve at least two important functions in an industrial laboratory. First it should increase the efficiency of the ordinary chemical work by relieving the chemist of qualitative examinations and lengthy and involved separations in the determination of minor impurities. Secondly, it should furnish information which is difficult if not actually impossible to obtain by ordinary chemical means. Under this latter category may be mentioned the analysis of extremely minute quantities of material, and the rapid rendering of results to those responsible for "continuous-operation" processes. The value of rapid assays in work such as ore-dressing, the smelting and purification of metals and chemical manufacture is so well recognised that any method which helps in this direction is worthy of careful consideration by the chemist in charge.

Equipping the Spectrographic Laboratory

Some Apparatus for Critical Work

To secure good results in spectrum analysis it is important to work with really efficient apparatus. The new large quartz spectrograph "QU 24," introduced by Carl Zeiss (London), Ltd. (Fig. 1), is suitable for photographic plates measuring 24 × 6 cm. This instrument is rigidly built and completely enclosed. It is sent out from the maker's factory in complete adjustment so that no further adjustment is required on the part of the user. The spectrum can be photographed over the whole range from 2,000 Å to 5,800 Å, special importance being attached to good definition of the lines over the whole range and flatness of field, which enables ordinary plates to be used.

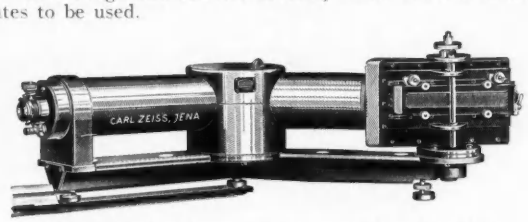

Fig. 1.—Zeiss Quartz Spectrograph "QU 24."

The evaluation of the spectrum obtained has hitherto mostly been carried out with a magnifier or microscope. Latterly it has been more conveniently done by projecting of the spectrum at a suitable magnification on to a white baseboard. For the purpose the new Zeiss spectrum projector (Fig. 2) is used. This instrument enables the spectrum to be observed in the normal way, with both eyes, and searched

Fig. 2—Spectrum Line Projector.

through in comfort. The tiring microscopic observation otherwise incurred when, for instance, a considerable number of analyses has to be made is therefore completely avoided.

The method formerly used for the quantitative evaluation of the spectrograms was to estimate the blackening of the lines to be compared, also with the aid of a miscroscope. This method, however, is limited to an estimation of the approximate equality of blackening of two lines, and so admits of the measurement of the concentration in steps only. Visual estimation, moreover, is liable to considerable uncertainty when the lines to be compared do not lie close together or are separated by other lines. These difficulties are avoided by the use of the new Zeiss spectrum line photometer (Fig. 3) which admits of reliable objective measurement of the blackening of the spectrum lines. Here an image of the light source is projected into the illuminating objective by the condenser mounted in the lamp housing, and illuminates the photographic plate, which is held by springs on the plate holder. A second objective projects a sharp image of the spectrum, about 20 times magnified, on to a precision slit. The light which passes through the precision slit on to a photo-electric cell situated directly behind it gives rise to a photo-electric current which is then measured with a reflecting galvanometer and a deflection reading telescope.

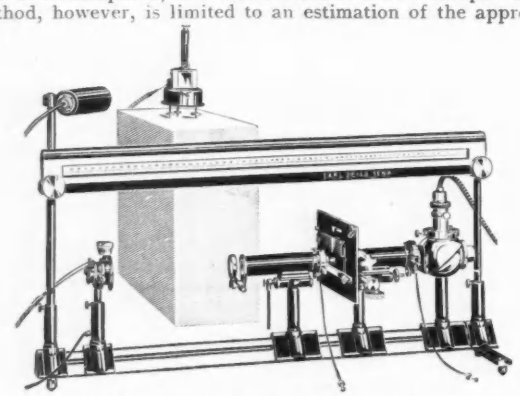

Fig. 3.—Spectrum Line Photometer.

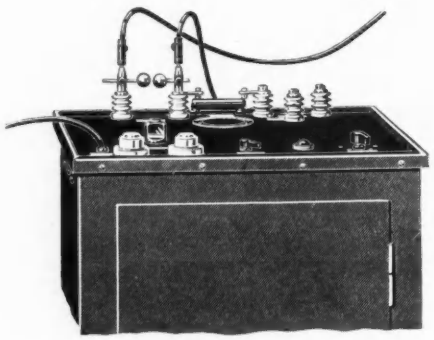

Fig. 4.—Feussner Spark Generators.

The introduction of the Feussner sparking apparatus (Fig. 4) also marks an important advance in that it enables the conditions in the spark to be maintained constant and reproduced.

Six New Dyestuffs

I.C.I. Continue To Meet Colour Users' Needs

ACRONOL YELLOW TCS is similar in general properties to Acronol Yellow TS, but possesses two important advantages over the latter, being greener and brighter in shade and having much better solubility. This product is valuable to textile printers as it is very suitable for printing on cotton, viscose, wool and silk by the methods normally employed for basic dyestuffs. It possesses the valuable property of being resistant to reducing agents and, on this account, is particularly useful to printers as an illuminating colour in hydrosulphite discharge styles. It is also of importance for dyeing on discharged tannin mordants and for use as a resist colour under Aniline Black. The dyestuff gives a bright yellow shade, practically unaffected by water, washing, stoving and acids, when dyed on tannin mordanted cotton and the shade is practically unaffected in the presence of copper. Particularly bright shades are obtained on weighted or unweighted silk.

DISPERSOL FAST ORANGE G150 POWDER is a particularly important addition to the range of Dispersol Fast dyestuffs, on account of its rich golden orange shade which possesses good fastness to light and very good fastness to washing, organic acids, alkalies and hot pressing. This new dyestuff is also of interest to textile printers by virtue of its shade. It is liable to sublime during the steaming operation, but in this respect it is superior to Duranol Orange GS paste Fine, which dyestuff is used, despite this defect, when brightness of shade is of paramount importance. Ground shades dyed with Dispersol Cast Orange G150 powder are very suitable for discharge by the Formosul-calcium sulpho-cyanide process. It is useful for application to wool skins for production of fast, level pastel shades.

THIONOL OLIVE RS may be applied to all types of cotton materials, linen, viscose, producing olive-brown shades of very good fastness to light, washing and alkalies, and excellent fastness to milling, organic and mineral acids and cross-dyeing. It will be of value for the dyeing of overall material, government drills, velvets, cords, the warps for mohair linings and union gabardines, and material which is subsequently to be rubber proofed both in self and combination shades. Slightly increased fastness to light is obtained by a copper-chrome after-treatment, but the shade becomes redder. Apart from its use as a self shade, Thionol Olive RS is of value as a " saddening " colour in compound shades.

DURANOL BLUE GN POWDER is an improved brand of Duranol Blue G, being rather more level dyeing and maintaining at a rather higher level its brilliancy of shade when employed in the production of full shades of blue. In addition, it embodies the very good fastness properties associated with Duranol Blue G and is slightly more resistant to the action of burnt gas fumes. It is of value for dyeing all forms of acetate silk. Its very good affinity for the acetate silk fibre is unaffected by the presence of salts, acids or alkalies in the dyebath and it may, therefore, be used in conjunction with other dyestuffs for the production of two-colour effects or of solid shades on mixed fibres by the one-bath process.

CHLORAZOL VISCOSE BLACK BS is suitable for dyeing all types of viscose artificial silk materials, producing a bluish-black shade which, in high percentages, maintains its blueness without the bronzing which is so often encountered when dyeing ordinary blacks. Although primarily intended for the dyeing of viscose, on which it gives a particularly attractive shade, this dyestuff is equally suitable for producing full, non-bronzing shades of black on cotton. It is also of interest for the production of full blacks on viscose-cotton unions. After-treatment with formaldehyde increases the fastness to water and washing.

THIONOL BRILLIANT GREEN 6GS is the yellowest and brightest green dyestuff of the sulphide type on the market and this, together with its superior fastness properties, will commend it to processors of cotton and viscose material and particularly to those manufacturers engaged in the dyeing of awning cloths. Thionol Brilliant Green 6GS is much yellower and a little brighter than Thionol Brilliant Green GS, to which it is superior in solubility and similar as regards general fastness properties. It may be employed for dyeing materials subsequently to be rubber-proofed by the cold cure vulcanising process.

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MOOR END WORKS, HUNSLET, LEEDS

Chemical Industry & Carl Duisberg—II*

By Professor Henry E. Armstrong, F.R.S.

[Continued from page 82 (July 27)]

IN undertaking the manufacture of phenacetin, together with that of sulphonal and trional, the firm embarked upon a new important branch of activity, in which they became leaders. Aspirin followed in a remarkable way. Some genius in the firm, if not Duisberg, bodily lifted into a patent specification a paper in "Liebig's Annalen" describing the preparation and properties of acetylsalicylic acid. Of course, the patent was lost when attacked in the courts—but no matter. The name *Aspirin*, which Duisberg had registered as a trade mark, still remained and gave the holders almost a monopoly. What's in a name? Everything! Names are not all equally sweet. The challenge to take an Aspirin is easily uttered—no one would think of asking for an Acetylsalicylic acid. Duisberg always prided himself upon being a judge of "technical effect"; in no other case was this better shown.

Post-War Activities

Gradually, as the firm prospered, Duisberg's productive activity as chemist gave way to a more general activity. In 1900 he entered the directorate and became mainly occupied in erecting a great new works at Leverkusen, which in every particular bears witness to his creative ability. He was particularly proud of the provision he made for the welfare of the workpeople. After the War he was largely occupied, in the first place, in organising the dyestuff industry; then German chemical industry as a whole—a task for which he was eminently suited by his masterful character, his great experience and above all his organising ability. The appreciation showered upon him on the occasion of his seventieth birthday was overwhelming in extent and sincerity.

Duisberg was much helped by Henry Böttinger, who had married into the firm before he entered it. Up to the time of his majority, Böttinger had lived at Burton-on-Trent, where his father was chemist at Allsopp's brewery. He was so entirely anglicised that he spoke German as if he were thinking in English. He took charge of the firm's external affairs and laid the foundation of their great success in Eastern markets. I have a presentation copy of a tremendous quarto tome, beautifully got up entirely in the works, a lithographed reproduction in script of the letters Böttinger wrote home to his family during his travels in India and China. He not only placed the firm's goods but also arranged for training centres in India at which instruction in dyeing was given to buyers of their dyestuffs. The use of native-grown vegetable dyes in the East was thereby greatly curtailed. Now indigo is almost supplanted by synthetic indigotin, although if the industry were organised the natural dyestuff could be produced with advantage. Böttinger was so active-minded that later on he became a Member of Parliament. Eventually he was *veradelt* and became a *von*.

God's Own Chemists

I have sketched Duisberg's character more than once: during the War, in "The Observer"; in "Chemistry and Industry" (March 27, 1931), apropos of an obituary notice of his great master Geuther which he had written for the German Chemical Society; recently (March 29) in "The Times." He must have been a lively youth. When I first knew him, soon after he went to Elberfeld, in the first blush of his success, he was the perfect Gascon, filled with an astounding conceit—really this was his great asset. So late as 1906, at our celebration of the jubilee of Perkin's discovery of the first aniline dyestuff, with complete unconcern and full belief in his words, he told us that we must regard Germans as God's own chemists, heaven-sent beings with whom it would be absurd for the world to enter into competition. Some of us smiled. We had discussed our position and long lamented our commercial weakness. Perkin, it is true, had been beaten from the field. Still, he had to his credit not only that he had made his discovery but had also started works by the time he was nineteen, without any Geuther to train him. Later, he was first in the field as the maker of alizarin.[1] Faraday, in 1825, had discovered benzene and analysed it accurately, even made the two naphthalenesulphonic acids out of which Teutonic chemists were to win fortunes; he had done not a little other chemical work. Lancaster had bred a chemist in Frankland. Personally, I had played to some effect with naphthalene and knew something of the colour game. I did not despair of our some day again wearing the shoes we had cast off too early; I knew we had recruits in the background. In fact, when Duisberg addressed us, the spirit was already at work in our Teutonic friends that made the late War inevitable. His own son, in saying "Good-bye" to my sons, in Lakeland, not very long before the War, expressed the hope that at no distant date he would meet them "on the field"; he even looked forward to becoming part owner of Derwentwater. This is sober fact. The German is a complex character. As chemists, it is essential for us to learn to dissect out the elements of his mentality. Having spent nearly three years as a student in Germany before the War of 1870, I have been witness of some of his interactions. Before '70, they were a primitive, almost pastoral, music-loving nation, wonderfully intelligent and absolutely indefatigable workers, asking only to be well led and ever willing to be led, almost child-like in their simplicity. On the other hand, they were curiously lacking in sense of proportion and without humour; you had not far to go below the surface to meet with unpleasant if not barbaric reactions, such as Wagner has brought out most wonderfully in his tetralogy—such as the Red Queen saw in Alice: "A nasty vicious temper."

Lack of Critical Power

Duisberg had lacked the critical power, in the way characteristic of his nation, to see sufficiently below the surface. He knew quite well that our failure was mainly commercial and that our university system was greatly in fault. He was too much overcome by his countrymen's overwhelming success in the industrial field; he did not see that no real attempt had been made by the world to meet their competition. The world, in fact, had been hypnotised by Germany's ordered progress.

Our action after the War was stupid. We allowed lawyers to put themselves in charge. These were followed by so-called business men. We have yet to give technical knowledge and efficiency their due place. This will ultimately be our sole chance of securing our proper share in the world's work. Our recent partial success in re-establishing the dyestuff industry may largely be attributed to the example set by Mr. James Morton, whose acute mind led him to surround himself with a picked band of competent workers and to accept their guidance unreservedly. The outstanding service rendered by his chief assistant, the late Dr. Thomas, has yet to be sufficiently recognised; he was the nearest approach to a Duisberg we have had. We have to take pains that we may breed such men—at present our schools are worthless for the purpose—indeed, they prevent them from arriving. If our industry is to prosper, we must abolish all clerical control of education and put it under men of scientific outlook—men who not only know something but also know how to use knowledge. The present ignorance of the schools will never give us this. The future of the dyestuff industry will depend entirely upon the attitude of the public towards colour—upon the development of the colour sense. The present world tendency is to abandon colour—everywhere black prevails: an almost lost sense has to be recovered.

Chemists belong to no nation: the world over they are a community; one in spirit, in thought and in method, interdependent in their work. Eventually they must lead the world, as they alone can understand its operations. The service Duisberg rendered was to the common good. All can recognise the worth of the man, apart from his nationality; the value of the great example he set, apart from his technical service, by the exercise of a wide public activity and a wide philanthropy. Only by the aid of such men will the world eventually be sufficiently brought together in harmonious interrelationship.

My article was written long in advance of the publication of Mr. Cronshaw's lecture "In Quest of Colour" in

* Reprinted from "Nature," with additions by the author.

[1] Good churchman as he was, he was one of the first to fly the Jolly Roger.

" Chemistry and Industry " and of my letter, in " Nature " of June 1, in which I ventured to question the argument he used that the dyestuff industry languished here because the pioneer spirit and the creative spirit which brought it into being abandoned it too early. I further said: I hold that the breakdown was entirely on the side represented by Mr. Cronshaw—the managerial and commercial side. My opinion is in no way changed by Mr. Cronshaw's reply of June 15. He misapplies invective as argument.

I have read his lecture more than once, with no little interest: it is a good, running commentary on the development of the industry but so condensed that only experts will be able to follow the story: it needs no little correction in several particulars to make it history.

Development of the Industry

Graebe and Liebermann did not start the manufacture of alizarin: their process was taken over and developed by the Badische, following Perkin's lead; neither they nor Perkin used the original G. and L. synthetic method. I believe Caro was much behind the early work.

The Roscoe school played no particular part in the development of the industry. Schorlemmer's work was on petroleum —he gave the first impetus to the study of the structure of the paraffins. Although a pioneer firm in the colour industry in Manchester, Roberts Dale and Co. never rose above mediocrity. W. H. Perkin, Jr., was the first to make organic chemistry go in Manchester. In some way, the subject seems foreign to the spirit of the locality: it has yet to be established upon a steadfast foundation, not merely tolerated. This will not be until the suggestion I have more than once made be carried into effect and a Professor appointed at £5,000 a year, at least, so that he may be free to devote himself entirely to his school. Certainly something needs doing to put the Manchunian House Chemical in order. The Germans will have us again, at no distant date, unless action to this end be taken without further delay.

Mr. Cronshaw connects the development of the sulphuric anhydride industry with the introduction of the process of making phthalic acid from naphthalene. It was started long before, in connection with the alizarin industry and was first established here at Silvertown. I have dealt with the subject in my Messel Memorial Lecture. Messel from an early date was alive to the inhibitive action of arsenic and other impurities: there was nothing novel in the account given by Knietsch in advertisement of the work of his firm: he could safely let his story loose.

Mr. Cronshaw speaks of Caro as retiring at thirty-five. He retired at about that age only from Manchester, full of industrial beans which he promptly sowed at Ludwigshafen. He was probably the master mind of the German dyestuff industry in its early days; he was successful in his own country but not in Manchester, because he was coupled with commercial men of developed intelligence. Whatever Caro's temper may have been, he was a consummate chemist.

Reminiscences

My experience is peculiar. I began to study chemistry under Hofmann in 1865, only nine years after Perkin's discovery of Mauve. In 1869 I worked alongside Graebe, just at the time when Liebermann and he had disclosed the structure of alizarin. I became acquainted with Perkin in 1870 and we were fellow secretaries of the Chemical Society five years later. I knew him intimately up to his death. He was the most unworldly man I have known. He had charge of the business on the practical side; his brother of the commercial. They were simple, happy people, unfitted to meet commercial competition. Starting from humble beginnings, they were well satisfied with what they got for their business. The aniline section passed into the hands of Brooke, Simpson and Spiller. Their firm had bought out Simpson, Maule and Nicholson, I have been told, for less than £100,000; they recouped themselves during the first year, it is said, by merely carrying on Nicholson's processes but they had not the remotest conception of the possibilities of the dyestuff industry. My fellow student, Meldola, went to them but left in disgust to become my successor at Finsbury in 1884. He was followed by Green. The firm was too ignorant to make use of either. Green has told the story.

I did " quite a little " work with coal tar products, hydrocarbons, phenols and naphthalene from 1871 on in my laboratory cellar at the London Institution; Wynne and I, at the Central, gave the industry the structure card for naphthalene di- and tri-derivatives—mainly with material made in Germany, never a bit in England; I speculated a good deal in origins of colour. Had I been in Germany I should have been retained, at an early date, by one or more firms, if not absorbed into the industry: I have never been offered sixpence by an English firm. Experience counts for nothing here—it is advisedly put aside.

A Position of Honour

Go to Mr. Cronshaw! I advise you to refresh your memory by reading a playful letter by Sir Wm. Pope in the " Morning Post " of October 8, 1923, under the heading " British Dyestuffs Corporation—Its Amateur Management." Also to be recommended for study is the pamplet issued by the Association of British Chemical Manufacturers, in March 1920, on "The Chemical Industries of German Rhineland—a summary of the report of the British Chemical Mission on Chemical Factories in the occupied area in Germany." The document is far too little known. The findings and warnings of the Commission are summed up in the sentence—" German chemical industry has been one stupenduous organisation for effecting and promoting the application of Science to Industry." In Germany, we learn, " the whole community takes interest in Chemical Industry; this indeed is one of the predominating factors of its welfare. As a consequence, the industy is assigned a position of honour and is viewed with a pride similar to that accorded in Britian to shipbuilding." Here, even now, though we have at last learnt to make dyestuffs once more, the chemist stalks the land without a house of his own, uncoordinated, unregarded, apparently with little desire to work with his fellows. The Ministries of Agriculture and of Health won't even have him upon their Committees. Medical Research, Agricultural Research, Public Food Inquiries, are carried on without his helping hands. Failure has not been on the side of the chemists. Fortunately for Germany she has had neither "Public Schools" nor "Sport." Germans have been a nation of intelligent, assiduous workers. Our future depends more upon developing commercial, industrial intelligence than in training chemists. At present, our schools are giving no adequate training to the class that is supposed to be the backbone of our country. The Ministry of Education forbids. General ignorance of the things that matter is to be found everywhere—even in the highest places.

Miss Elizabeth Benn, elder daughter of Sir Ernest and Lady Benn, was married to Mr. Paul A. Shinkman at St. Peter's Church, Tandridge, Surrey, on July 30th

I.C.I. Petition for Reduction of Capital

Opposition by Deferred Shareholders

IN the Chancery Division on July 25, Mr. Justice Eve commenced the hearing of the petition of Imperial Chemical Industries, Ltd., for the confirmation by the Court of a reduction of its capital from £95,000,000 to £89,565,859, which is being opposed by a committee representing 12,000 deferred shareholders.

Mr. Gavin Simonds, K.C., Mr. Lionel Cohen, K.C., and Mr. Cecil Turner appeared for the company, and Sir Wm. Jowitt, K.C., Mr. H. J. Wallington, K.C., and Mr. Danckwerts for the opposing shareholders.

Mr. Gavin Simonds said the company was one of unusual magnitude and was incorporated in December, 1896, to amalgamate a number of large industrial concerns. The £95,000,000 authorised capital was divided as follows: 22,727,000 seven per cent. £1 cumulative preference shares, 43,767,355 £1 ordinary shares, 21,745,290 10s. deferred shares, 15,133,000 unclassified shares of £1 each, and 5,000,000 unclassified shares of 10s. each.

How the Shareholders Voted

The reduction of capital which the Court was being asked to confirm arose out of the amalgamation of the deferred shares with the ordinary shares, that was to say, the deferred shareholders were being asked to exchange their deferred shares for ordinary shares, receiving one ordinary share for every four deferred shares which they now held. Almost the whole of the preference shares had been issued, and 43,756,659 ordinary shares and 21,736,654 deferred shares had been issued. Of the deferred shares only 2,482,645 had been paid in cash.

The resolution for the reduction of the capital was passed by an overwhelming majority of the company. Of the ordinary shareholders 94 per cent. voted for the resolution and 5 per cent. against. Seventy-nine or 80 per cent. of the deferred shareholders were in favour of the resolution and 19 or 20 per cent. were against.

A large part of the opposition was founded on suggestions that the directors had somehow miscalculated and that someone else was right in saying that in the future larger profits would be available for payment of the deferred shareholders. The company had been asked to give the opponents of the reduction all sorts of information, without which their opposition could not be put before the Court.

No one, except the directors of the company and the accountants who advised them, could really form a view of any value regarding the prospects of the company. Having given the matter their full consideration the directors now came before the Court to say that they had dealt fairly as between the ordinary shareholders and the deferred shareholders. The directors had issued a circular to the shareholders in April last in which they stated that the board believed that both classes of shareholders would benefit from the proposals, although these benefits might be effective at different times.

Position Under New Proposals

An advantage to the ordinary shareholders arose from the fact that they would become owners *pari passu* with the holders of the reduced deferred shares (which were to be converted into ordinary shares) of the full equity in the profits of the company, which remained after the satisfaction of the prior charges. The voting rights of the ordinary shareholders, *viz.*, one vote per share, would remain unchanged. The deferred shareholders would gain an immediate increase in the rate of dividend on their nominal capital.

Counsel pointed out that under the present proposals, in the event of a winding up of the company, the deferred shareholders would rank equally with the ordinary shareholders for a return of capital (after the rights of the preference shareholders had been provided for) and for participation in surplus assets, but the nominal capital in respect of which they would be entitled to rank was halved by the scheme. If the present proposals were adopted, the deferred shareholders would be entitled to share with the existing ordinary shareholders in any capitalisation of surplus profits in the proportion which the nominal value of their new ordinary shares bore to the nominal value of the existing ordinary shares.

With regard to the opponents, they thought the point that the information which had been given to the shareholders was inadequate and in some cases misleading. To show that that was not so, counsel said he would have to refer to a large number of documents. In few instances had such full information been given to shareholders as has been given to shareholders of their company in the annual report of 1934. That report contained, in particular, a most interesting and complete statistical record over a number of years and what the company had been doing.

Every one of the directors had considered the scheme which was before the Court and had given it his particular attention, and counsel was satisfied that it was a fair arrangement as between the shareholders and one which was beneficial to the company.

At a shareholders' meeting in May, 1935, after a speech by the chairman, there was a full discussion and votes were taken of the two classes of shareholders concerned. Counsel maintained that the arrangement was capable of being to the advantage of both classes of shareholders, and in the present case the scheme was to the advantage of both the ordinary and deferred shareholders.

Sir Wm. Jowitt, K.C., read an affadavit made by Mr. John Kennedy Carruth, a company director, and chairman of the deferred shareholders' committee.

In his affadavit, Mr. Carruth said that his committee submitted that the scheme put forward by the directors was not only unnecessary and uncalled for, but was unfair to the deferred shareholders. The result of the proposed fusion was that deferred capital became only one-eighth of the ordinary capital instead of one-fourth as at present. The committee submitted that, far from being designed to assist the deferred shareholders by relieving them from the disadvantages due to the provision of reserves, the scheme was designed to facilitate the provision of a reserve for the benefit of the present ordinary shareholders to the extent of eight-ninths thereof.

The Directors' Holdings

The total nominal value of directors' holdings in ordinary shares was £393,347, of which market values at May 1 last were £688,357, and £6,807 deferred shares of which the market values were £5,780.

The committee made no charge of bad faith against the directors, but submitted that the large amount of ordinary shares held by the directors in comparison with the deferred shares made it difficult, if not impossible, for the directors to appreciate the true views and interests of the deferred shareholders in respect of the scheme and to retain a wholly unbiased view of the proposals contained in the scheme. The committee also thought that the directors should have informed the deferred shareholders of the nature and extent of the directors' personal interest in the scheme, being carried by means of the proxies they solicited.

Mr. Cohen said in recommending the scheme the board of directors had in mind nothing other than the best interests of the company.

Sir Wm. Jowitt read an affadavit by Mr. Henry Morgan, incorporated accountant and partner in Morgan Bros. and Co., who expressed the opinion that the scheme was unfavourable and inequitable to the deferred shareholders.

Sir Harry McGowan, chairman of the I.C.I., gave evidence and in cross-examination by Sir Wm. Jowitt agreed that it was fallacious to judge the value of shares merely on the basis of their yield.

Sir Harry McGowan, further cross-examined, agreed that in the circular issued by the directors to the shareholders regarding the scheme no mention was made of the fact that large sums had been put to reserve and that part of them had been used for writing off excess values. But, he added, in the envelope that contained the circular there was also the report for 1934, which contained a statistical record of the company since its inception and disclosed the reserves at the end of each year. The existence of reserves was made clear. The circular contained all the relevant information. Witness agreed that the existence of reserves of the company

was a highly relevant factor for a shareholder to weigh when considering whether he should vote in favour of the scheme before the Court. The circular was carefully considered by the Board and they thought they had disclosed all the relevant factors.

Dealing with the question of rationalisation, Sir Harry said that the company started with the object of rationalising the industry of manufacturing chemicals in this country. The rationalisation effected by the I.C.I. had been successful, although prices had been reduced to customers. It had involved the closing down of certain factories which the company had bought. The closed-down factory was written off altogether and assuming that it was one of three factories, the other two factories acquired intangible asset in the form of goodwill derived from the third factory.

The company had spent £6,000,000 on plant to produce petrol from coal. He believed that the £6,000,000 would produce a profit, but not yet.

Up till the present time the operations of the company had not been disappointing, but factors were now coming into operation which would be to the disadvantage of the company.

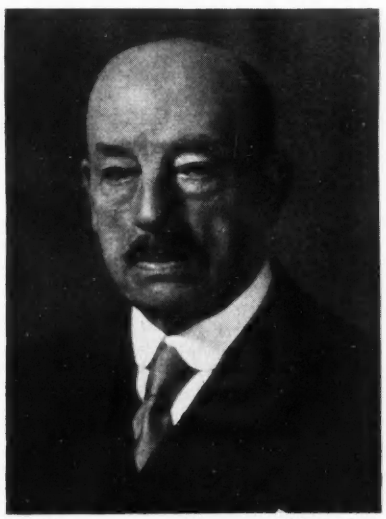
Re-examined, Sir Harry said that he saw no possibility of the company earning largely increased profits, or of having to put smaller sums to reserve in the near future.

Sir Wm. McLintock, chartered accountant, was also cross-examined, and the further hearing was adjourned until next sittings.

Death of Mr. C. T. Kingzett

An Early Advocate of Chemistry House Scheme

THE death occurred at his home at West Byfleet, Surrey, on Monday, of Mr. Charles Thomas Kingzett, whose name was known throughout the chemical industry on account of his valuable contributions to the literature of chemistry. Mr. Kingzett, who was 82 years of age, was one of the founders



Photo] [Elliott & Fry

The Late Mr. C. T. Kingzett.

of the Institute of Chemistry, and at the recent Charter Jubilee celebrations of the Institute it was recalled that he became a Fellow in 1877 and was a member of the Council from 1877 to 1882 and again from 1893 to 1894.

Born at Oxford in 1852, he was an Associate of Arts, Oxford, having studied chemistry as one of his special subjects for four years under Sir B. C. Brodie and Madan. He gained his experience as a chemist with the late Walter Weldon in connection with chlorine manufacturing processes and the recovery of sulphur from alkali waste, and as chief chemist of Snape's Soda Works, Liverpool. In 1881 he became a member of the Society of Public Analysts, and was vice-president in 1885-6.

His researches in chemistry embraced a number of subjects, concerning ozone and the oxidisation of terpenes and essential oils by air, oxygen and ozone (which led to the discovery of the Sanitas products and their manufacture), the first isolation of calcium hypochlorite from bleaching powder (1875), the discovery of the antiseptic properties of hydrogen dioxide (1876), the resuscitation of the theory of the "Oneness of Matter," 1871, and various other investigations concerning the subjects of disinfection, bacteriology and hygiene. He took out several patents concerning disinfectants, sulphur fumigating candles and other sanitary appliances. He was the founder of the "Sanitas" Co., Ltd., and was for many years responsible for its development and control. He was prime mover with Edmund Neison in the formation of the Institute of Chemistry and took steps to create a "Chemistry House" under the title of "A Plea for a Real Institute of Chemistry," published in an article in the technical Press in April, 1916. He was much interested in the newer views of physicists concerning the structure of matter and insistently professed a disbelief in the existence of the so-called "æther."

In addition to those relating to chemical research his publications included "History, Products and Processes of the Alkali Trade" (Longmans, 1877), "Animal Chemistry or the Relations of Chemistry to Physiology and Pathology" (Longmans, 1878), "Nature's Hygiene and Sanitary Chemistry" (Ballière, Tindall and Cox, 1880-1907), Pocket Dictionary of Hygiene (Ballière, Tindall and Cox, 1898-1904), Chemistry for Beginners and Schools (Ballière, Tindall and Cox, 1917-1922), and Chemical Encyclopædia (Ballière, Tindall and Cox), the fifth edition of which was published in May, 1932.

Oil Production from Coal

Progress at the Billingham Works of I.C.I.

THE progress of the work of extracting oil from coal at the Billingham Works of I.C.I. was described by Captain H. Crookshank, the Secretary for Mines, in reply to a question in the House of Commons by Mr. George Hall (Soc., Aberdare), on July 30.

Captain Crookshank said the best answer was contained in a statement supplied to him by Imperial Chemical Industries, Ltd., who informed him that petrol production was begun at Billingham on February 7, 1935, and that since that date a total quantity of 25,000 tons (7½ million gal.) had been manufactured. Deliveries to the Anglo-American Oil Company and Shell-Mex and B.P., Ltd., who distributed the petrol through their organisations, began on April 9, and 20,000 tons (6 million gal.) had been marketed to-date, the balance of the production having gone to storage for building up working stocks in addition to further large stocks of intermediate products.

"The petrol," continued the statement, "is taken over by the oil companies to the specification of their first grade marketed spirit and needs no further blending or treatment. Contracts have been arranged by Imperial Chemical Industries for the purchase of creosote oil and low-temperature tar oils as raw material for hydrogenation at prices which should materially benefit the carbonising industries. The total quantity of these materials contracted for is based on the programme already announced of making 100,000 tons of petrol direct from coal and 50,000 tons from tar products, equal in all to 45 million gal. a year.

"The coal hydrogenation plant operates in two main stages —the liquid phase or coal stage, and the vapour phase or light oil stage. The operation of the former necessitates the simultaneous operation of the latter, whereas the latter stage can be operated alone on creosote and low-temperature tar oils. Naturally, therefore, Imperial Chemical Industries completed first the vapour phase part of the plant, and, as indicated, production therefrom has been entirely satisfactory. The liquid phase stage is now being brought into operation, and coal is, in fact, being successfully treated.

"It is anticipated that operations on the full scale mentioned above will be attained by about October. The coal required, when the plant is in full operation, will, including that required for the treatment of creosote and low-temperature tar, amount to well over half a million tons, representing the employment of about 1,050 miners. The number of persons now employed on the plant is about 1,000, and employment in secondary industries will be found for a considerable number of people."

If Sir Ernest Benn Were Dictator

Royal Commercial Travellers' School Speech Day

LADY BENN distributed the prizes at the Royal Commercial Travellers' School at Pinner on July 27, and Sir Ernest Benn addressed the boys and girls. "I want you to take a deep, keen interest in your English," said Sir Ernest. "For my part I know of nothing more important or more helpful in life. If only you can frame a sentence and choose your words well and 'put it nicely' three parts of the job is done. I refer you with great respect to the poets and to the majority of the literary people, who, because they can use the English tongue to perfection, are able to get away with the most utter nonsense imaginable."

Those who were entering commerce would find good English of the highest value. It would put them above the middle-class commercial world where English was badly wanted. Most of the boys and girls at Pinner were the children of commercial travellers, a fact of which they should be exceedingly proud, and he hoped they would follow the same great and honourable road. The commercial traveller, the man whose job it was to form the vital link between production and consumption, was the pillar upon which the whole economic system depended. It was because we had fallen into the hands of the professors and the politicians, who talked of poverty and plenty side by side and who went in for all sorts of planning, that we were suffering from our present economic troubles. If he were a dictator and had his way he would put every politician and professor by law on the road.

Speaking of loyalty, Sir Ernest said we had arrived at a phase in which we were supposed to be internationally minded. The brotherhood of man was supposed to be uppermost in our minds, and there were people who would sneer if one said one was proud to be a Britisher, but there was no reason whatever why they should not be better subjects of the world through being proud and loyal citizens of their own country. If a boy's name was Smith, he did not want to be Brown; he was pleased to be a member of his own family and he pulled his weight to make his family of value to the rest of the world. The same principle applied to the school. He was proud to be a member of his school, and there was not one amongst them who would change it for any other school. They must be thankful that they were Britishers. By developing that sentiment in the right way they were setting an example to other people. The same sort of rivalry that existed between Pinner and Eton existed between Britain and other countries. Civilisation would be promoted that way instead of tumbling about them, as was happening to-day all over the world. The State, which ought to be an inspiration, had been degraded. In these difficult modern post-war times it had been dragged down to a curious thing which sold potatoes, paid pensions, borrowed money and played curious tricks with gold. It was up to the younger generation to get us back to the old state, a state which would be an inspiration, a thing to be proud of, a source of self-respect, a thing which would make each one feel it was up to him to serve his King and country to the best of his ability.

Thanks were accorded to Sir Ernest and Lady Benn on the proposition of Mr. E. B. Baggallay, president of the school.

Personal Notes

MR. WALTER JAMES COLES, a director of Edgar Allen and Co., of Sheffield, died on July 25, at the age of 60.

MR. H. A. TURNER has been appointed assistant lecturer in textile chemistry in the faculty of Technology of the University of Manchester.

SIR EDWIN STOCKTON, of Manchester, was on July 25 re-elected president of the Machinery Users' Association for the ensuing year. Sir Edwin is chairman of British Breda Silk and British Visada, and vice-chairman of Transparent Paper.

ALDERMAN SIR THOMAS KEENS, chairman of the finance committee, has been elected chairman of Bedfordshire County Council in succession to the late Lord Ampthill. Sir Thomas Keens, who is a director of B. Laporte, Ltd., Luton, has served on the Council for over 30 years.

MR. A. B. WINTERBOTTOM, a research metallurgist, has been awarded a Robert Blair Fellowship. Mr. Winterbottom, who is a Manchester scientist, is at present studying at the Fysisk Institute, at Trondhjem, in Norway. A grant of £450 is made in connection with the fellowship, which is the highest educational award made by the London County Council.

MR. J. A. D. PAUL has been appointed by W. J. Bush and Co., Ltd., as successor to the late Mr. F. Bedding, on their Yorkshire and North of England territory. Mr. Paul hails from the Isle of Man and was educated at King William's College. He has been connected with the sales staff at Hackney for several years. Mr. Paul takes over his new duties early in August.

SIR HAROLD HARTLEY, F.R.S., chairman of the British National Committee, has been elected chairman of the International Executive Council of the World Power Conference, as successor to the late Mr. D. N. Dunlop. The Conference was founded by Mr. Dunlop in 1924 to form a link between the different branches of power and fuel technology on the one hand, and between engineers, administrators, scientists and economists on the other. The choice of Sir Harold Hartley as chairman is peculiarly appropriate as his activities extend into each of these spheres, since as a vice-president of the London Midland and Scottish Railway Co., and director of research of that transport system, he is in close touch with industrial problems, and he is also chairman of the Fuel Research Board.

MR. PETER A. MCKILLOP, who for the last 35 years has represented the Vacuum Oil Co., Ltd., in Scotland, has retired. At the Grosvenor Restaurant, Glasgow, on Tuesday, a complimentary dinner was given in his honour and a host of colleagues and business friends, well known in Scottish industry, joined in wishing their old friend long years in which to enjoy a well-earned rest. Mr. A. S. Giffen, manager for Scotland, presented Mr. McKillop with a wireless set as a token of esteem from his colleagues, and was followed by Mr. H. M. Barker, director, who spoke of the friendship and loyalty which had always existed between the company and Mr. McKillop, whose success through ability and hard work had been an inspiration to every member of the organisation. Mr. McKillop is an active member of the Institute of Engineers and Shipbuilders, the Institute of Electrical Engineers, the Institute of Mining and Electrical Engineers, and is a past-president of the Engineers "Forty" Club.

Production of Distilled Water

A New Automatic Still

THE new automatic still manufactured by Baird and Tatlock will produce distilled water at either 4 or 5½ pints per hour, according to model. The body of the still is of polished copper, heavily tinned inside, while the boiler is in one piece and seamless. Condensing tube and distilled water outlet is in one piece of pure tin. Complete accessibility of all parts is provided for by removing three wing nuts at the bottom of the condenser, and withdrawing the pure tin condenser tube. A safety device is fitted which ejects the electric plug should the water supply fail or inadvertently be turned off. This cuts off the current from the still automatically before the temperature rises sufficiently to cause damage, and at the same time calls attention to the failure of the water supply. It is impossible to re-insert the plug until the still has cooled to its normal working temperature. All steam loss is avoided by a water-sealed joint round the lid, and while the incoming water cools the outgoing steam in the condenser it is itself warmed up before reaching the pan. Operation is entirely automatic, the plant being suitable for any voltage from 200 to 250. Consumption is only 1,500 watts for the smaller model and 2,000 for the larger.

THE Cuban Air Products Corporation, which has manufactured liquid carbonic gas, using the coke process, for some time, is reported to be extending its activities to include the manufacture of dry ice. While there is a potential market for it in connection with the shipment to the United States of mangos and other fruits which require special refrigeration conditions, as well as for use in containers of ice cream for home consumption and similar local uses, actual production of dry ice is something of an experiment in Cuba.

News from the Allied Industries

Artificial Silk

WORLD PRODUCTION OF RAYON (excluding staple fibre) during the first half of 1935 is estimated at the record total of 208,075,000 kg. against 169,040,000 kg. in the corresponding period of 1934. World output of staple fibre (cut rayon) is estimated at 16,460,000 kg. compared with 10,105,000 kg.

Shale Oil

NEGOTIATIONS HAVE TAKEN PLACE between the Scottish Shale and Oil Workers' Union and Scottish Oils, Ltd., on proposals for an all-round increase in wages, one week's annual holiday with pay, and better wage terms for boys and youths in the shale mines. The directors of Scottish Oils, Ltd., stated that they were unable to grant a holiday concession this year, but would give the request further consideration. They added that it would be the middle of August before they knew their position in regard to the increased market for heavy oil for Diesel engines, but gave the assurance that the workers' conditions would have full consideration when times became more prosperous.

Non-Ferrous Metals

ACCORDING TO THE JULY BULLETIN of the International Tin Research and Development Council world production of tin in the first five months of 1935 totalled 45,089 tons, an increase of 3,032 tons over the production for the corresponding period of 1934. The apparent world consumption of tin shows a 15 per cent. increase this year, the figures for January to May being 56,243 tons in 1935 against 48,931 tons in 1934. During the year ended May, 1935, many countries showed considerable increases in consumption, including Russia with an increase of 15.1 per cent., Canada 29.2 per cent., Holland 25.0 per cent., Japan 15.1 per cent., India 15.5 per cent. and Sweden 17.2 per cent.

Iron and Steel

FOLLOWING NEGOTIATIONS AT BRUSSELS between British steelmasters and the International Steel Cartel, the provisional agreement which was due to expire on August 7 has been extended for four months pending the constitution of a central sales control office in London. Agreement has been reached between the British steel representatives and the Steel Cartel that the quota for exports to Great Britain for the year beginning August 8 shall be 670,000 tons, and that for the following four years the annual quota shall be 525,000 tons.

Calico Printing

FIRMS IN THE CALICO PRINTING SECTION of the textile industry are following the example of the piece goods dyeing section and are considering a reorganisation scheme dealing with redundancy. A committee has been working out the details of a scheme, but Mr. J. L. Edmondson, secretary of the Federation of Calico Printers' Associations, said it was too early at this stage to make any statement. The next section which is expected to tackle redundancy is the bleaching trade, and the matter has already been informally discussed by leading firms.

Continental Chemical Notes

Czecho-Slovakia

A TOTAL OF 100 GRAMS OF RADIUM has now been extracted at the State Radium Factory, at Joachimstal.

Spain

A GOVERNMENT RESEARCH DEPARTMENT is to be established for investigating the adaptability to liquid fuel production of the available raw materials in the shape of bituminous coal, lignite, oil shale, etc. Legislation is also being drafted with a view to securing a large measure of State control over the economic development of the synthetic liquid fuel industry.

Hungary

A WIDE RANGE OF HITHERTO IMPORTED CHEMICALS are now made in Hungary, reports Vegyi Ipar, these including lactic acid (Gschwindt Spirit Factory, Budapest); chromium sulphate (Metal Trading Company, Nugyteteny); hydrosulphite and other textile chemicals (Count Ludwig Batthyany's Chemical Works, Polgardi); hydrogen peroxide, potassium chlorate and sulphides (Hungaria Artificial Fertiliser Works, Budapest); pure toluene (Municipal Gasworks, Budapest).

Italy

AMONGST RECENT DEVELOPMENTS in the chemical industry for which concessions have been granted are the following: Glycerin refining plant, Soc. An. Oleifici dell'Italia Meridionale of Bari; technical fatty acids distillation plant, Ambrogio Silva of Seregno (Milan); enlargement of plant for making vanillin from eugenol, and a new plant for guaiacol production with a view to subsequent conversion into vanillin and ethyl vanillin, Soc. An. Industrie Chimiche Meridionali of Milan; extension to plants for manufacture of bromine and bromine derivatives, Soc. Italiana del Bromo of Rome; extensions to low viscosity nitrocellulose plant, Soc. An. Italiana Cellulosa e Derivati of Milan; and a new plant for metallic sodium and potassium, Soc. An. Azogeno of Genoa.

France

CERIUM COMPOUNDS ARE BEING MANUFACTURED at the Loos-lez-Lilles works of Société d'Utilisation des Metaux.

PLANT EXTENSIONS in connection with aluminium and synthetic gem manufacture were carried out last year by Société d'Electro-Chimie d'Ugine.

Switzerland

AMONG NEW COMPANY REGISTRATIONS are the following: Soc. Anglo-Suisse de Radium S.A., Lausanne (treatment of radium and its salts, mining concessions being acquired in Portugal and a factory being taken over in Shepton Mallet, Somersetshire); Jean Trussel, Noville (soaps and other chemical products); G. H. Schmidt and Co., Zurich (technical chemicals).

Germany

A NEW ELECTROLYTIC APPARATUS for fluorine production is described by Professor Max Bodenstein and co-workers in the "Chemische Fabrik," July 24.

COMPOUNDS OF THE GLYOXALINE (IMIDAZOLE) SERIES, some of which possess useful medicinal properties, can now be synthesised with comparative ease by a new method described by Weidenhagen in the "Chemiker-Zeitung," July 24 (p. 604).

SUGAR XANTHOGENATES are a new class of sugar derivatives described by Dr. T. Lieser and co-workers in the "Chemiker-Zeitung," July 24 (p. 605). Contrary to statements in earlier literature, a new direct method now yields the cuproxanthogenate of glucose in the form of the methyl glucoside. Apart from their value in elucidating the mechanism of the cellulose xanthogenate (viscose) reaction, the new family of compounds are useful intermediates for other new substances.

IT is reported that ortho- and para-toluidine, coal-tar intermediates for the manufacture of dyes, are now produced in Japan by the Teikoku Senryo Kaisha, and that the company may soon place its surplus production of these intermediates on the market.

Chemical and Allied Stocks and Shares

Current Quotations

THE following table shows this week's Stock Exchange quotations of chemical and allied stocks and shares compared with those of last week. Except where otherwise shown the shares are of £1 denomination.

Name.	July 30.	July 23.
Anglo-Iranian Oil Co., Ltd. Ord.	59/4½	60/-
,, 8% Cum. Pref.	36/3	36/3
,, 9% Cum. Pref.	37/6	37/6
Associated Dyers and Cleaners, Ltd. Ord.	1/10½	1/10½
,, 6½% Cum. Pref.	4/4½	4/4½
Associated Portland Cement Manufacturers, Ltd. Ord.	55/6	55/6
,, 5% Cum. Pref.	27/6	27/-
Benzol & By-Products, Ltd. 6% Cum. Part Pref.	2/6	2/6
Berger (Lewis) & Sons, Ltd. Ord.	61/3	61/3
Bleachers' Association, Ltd. Ord.	6/-	6/-
,, 5½% Cum. Pref.	9/4½	9/4½
Boake, A., Roberts & Co., Ltd. 5% Pref. (Cum.)	21/3	21/3
Boots Pure Drug Co., Ltd. Ord. (5/-)	49/3	49/3
Borax Consolidated, Ltd. Pfd. Ord. (£)	95/-	95/-
,, Defd. Ord.	16/3	16/3
,, 5½% Cum. Pref. (£10)	£11/2/6	£11/2/6
,, 4½% Deb. (1st Mort.) Red. (£100)	£109	£109
,, 4½% 2nd Mort. Deb. Red. (£100)	£104	£104
Bradford Dyers' Association, Ltd. Ord.	9/4½	9/4½
,, 5% Cum. Pref.	11/10½	11/10½
,, 4% 1st Mort. Perp. Deb. (£100)	£84/10/-	£84/10/-
British Celanese, Ltd. 7% 1st Cum. Pref.	26/6	27/-
,, 7½% Part. 2nd Cum. Pref.	22/3	22/6
British Cotton & Wool Dyers' Association Ltd. Ord. (5/-)	5/-	5/-
,, 4% 1st Mort. Deb. Red. (£100)	£91	£91
British Cyanides Co., Ltd. Ord. (2/-)	3/3	3/3
British Drug Houses, Ltd. Ord.	20/-	20/-
,, 5% Cum. Pref.	22/6	22/6
British Glues and Chemicals, Ltd. Ord. (4/-)	6/-	6/-
,, 8% Pref. (Cum. and Part.)	29/4½	29/4½
British Oil and Cake Mills, Ltd. Cum. Pfd. Ord.	48/1½	48/9
,, 5½% Cum. Pref.	26/3	26/3
,, 4½% First Mort. Deb. Red. (£100)	£107/10/-	£107/10/-
British Oxygen Co., Ltd. Ord.	115/-	105/-
,, 6½% Cum. Pref.	31/10½	31/10½
British Portland Cement Manufacturers, Ltd. Ord.	90/-	90/-
,, 6% Cum. Pref.	31/-	31/-
Bryant & May, Ltd. Pref.	67/6	67/6
Burt, Boulton & Haywood, Ltd. Ord.	21/3	20/-
,, 7% Cum. Pref.	27/6	27/6
,, 6% 1st Mort. Deb. Red. (£100)	£105/10/-	£105/10/-
Bush, W. J., & Co., Ltd. 5% Cum. Pref. (£5)	105/-	105/-
,, 4% 1st Mort. Deb. Red. (£100)	£96/10/-	£96/10/-
Calico Printers' Association, Ltd. Ord.	11/3	11/3
,, 5% Pref. (Cum.)	17/6	17/6
Cellulose Acetate Silk Co., Ltd. Ord.	11/3	10/7½
,, Deferred (1/-)	1/10½	1/10½
Consett Iron Co., Ltd. Ord.	7/3	7/3
,, 8% Pref.	25/-	25/-
,, 6% First Deb. stock, Red. (£100)	£105/10/-	£105/10/-
Cooper, McDougall & Robertson, Ltd. Ord.	36/3	36/3
,, 7% Cum. Pref.	30/-	30/-
Courtaulds, Ltd. Ord.	55/-	53/9
,, 5% Cum.	26/3	26/3
Crosfield, Joseph, & Sons, Ltd. 5% Cum. Pre-Pref.	25/-	25/-
,, Cum. 6% Pref.	28/9	28/9
,, 6½% Cum. Pref.	30/-	30/-
,, 7½% "A" Cum. Pref.	30/7½	30/7½
Distillers Co., Ltd. Ord.	93/-	93/-
,, 6% Pref. Stock Cum.	30/6	30/6
Dorman Long & Co., Ltd. Ord.	18/3	18/9
,, Prefd. Ord.	22/3	22/6
,, 6½% Non-Cum. 1st Pref.	21/3	21/6
,, 8% Non-Cum. 2nd Pref.	19/9	20/-
,, 4% First Mort. Perp. Deb. (£100)	£102/10/-	£102/10/-
,, 5% 1st Mort. Red. Deb. (£100)	£104	£104
English Velvet & Cord Dyers' Association, Ltd. Ord.	5/-	5/-
,, 5% Cum. Pref.	8/1½	8/1½
,, 4% First Mort. Deb. Red. (£100)	£70	£70
Fison, Packard & Prentice, Ltd. Ord.	37/6	38/9
,, 7% Non-Cum. Pref.	30/-	30/-
,, 4½% Debs. (Reg.) Red. (£100)	£106	£106
Gas Light & Coke Co. Ord.	28/3	28/3
,, 3½% Maximum Stock (£100)	£90/10/-	£90/10/-
,, 4% Consolidated Pref. Stock (£100)	£109/10/-	£109/10/-
,, 3% Consolidated Deb. Stock, Irred. (£100)	£90/10/-	£90/10/-
,, 5% Deb. Stock, Red. (£100)	£116/10/-	£116/10/-
,, 4½% Red. Deb. Stock (1960-65) (£100)	£113/10/-	£113/10/-
Goodlass Wall & Lead Industries, Ltd. Ord. (10/-)	12/6	12/6
,, 7% Prefd. Ord. (10/-)	13/1½	13/1½
,, 7% Cum. Pref.	30/-	30/-
Gossage, William, & Sons, Ltd. 5% 1st Cum. Pref.	24/4½	24/4½
,, 6½% Cum. Pref.	30/-	30/-
Imperial Chemical Industries, Ltd. Ord.	35/3	35/3
,, Deferred (10/-)	8/9	8/9
,, 7% Cum. Pref.	33/3	33/3
Imperial Smelting Corporation, Ltd. Ord.	13/6	13/6
,, 6% Pref. (Cum.)	22/6	22/6
International Nickel Co. of Canada, Ltd. Cum.	$28½	$27⅞
Johnson, Matthey & Co., Ltd. 5% Cum. Pref. (£5)	95/-	95/-
,, 4% Mort. Deb. Red. (£100)	£98/10/-	£98/10/-
Laporte, B., Ltd. Ord.	107/6	107/6
Lawes Chemical Manure Co., Ltd. Ord. (1/-)	5/7½	5/7½
,, 7% Non-Cum. Part Pref. (10/-)	10/-	10/-
Lever Bros. Ltd. 7% Cum. Pref.	32/-	32/3
,, 8% Cum. "A" Pref.	32/3	32/3
,, 20% Cum. Prefd. Ord.	77/6	77/6
,, 5% Cons. Deb. (£100)	£109	£109/10/-
,, 4% Cons. Deb. (£100)	£105	£105
Magadi Soda Co., Ltd. 12½% Pref. Ord. (5/-)	1/3	1/3
,, 6% 2nd Pref. (5/-)	6d.	6d.
,, 6% 1st Debs. (Reg.)	£58	£58
Major & Co., Ltd. Ord. (5/-)	7½d.	7½d.
,, 8% Part. Prefd. Ord. (10/-)	9d.	9d.
,, 7½% Cum. Pref.	1/6⅜	1/7⅜
Pinchin, Johnson & Co., Ltd. Ord. (10/-)	42/-	42/-
,, 7% Cum. Pref.	33/1½	33/1½
Potash Syndicate of Germany (Deutsches Kalisyndikat G.m.b.H.) 7% Gld. Ln. Sr. "A" and "B" Rd.	£70/10/-	£70/10/-
Reckitt & Sons, Ltd. Ord.	115/-	115/-
,, 4½% Cum. 1st Pref.	25/-	25/-
Salt Union, Ltd. Ord.	41/3	41/3
,, Pref.	46/3	46/3
,, 4½ Deb. (£100)	£109/10/-	£109/10/-
South Metropolitan Gas Co., Ord. (£100)	£127	£125/10/-
,, 6% Irred. Pref. (£100)	£149/10/-	£149/10/-
,, 4% Pref. (Irred.) (£100)	£108/10/-	£108/10/-
,, Perpetual 3% Deb. (£100)	£88/10/-	£88/10/-
,, 5% Red. Deb. 1950-60 (£100)	£114/10/-	£114/10/-
Setavley Coal & Iron Co., Ltd. Ord.	44/4½	43/9
Stevenson & Howell, Ltd., 6½% Cum. Pref.	26/3	26/3
Triplex Safety Glass Co., Ltd. Ord. (10/-)	75/-	66/3
Unilever, Ltd. Ord.	31/3	32/6
,, 7% Cum. Pref.	29/3	29/3
United Glass Bottle Manufacturers, Ltd. Ord.	41/-	39/6
,, 7½% Cum. Pref.	33/-	33/-
United Molasses Co. Ltd. Ord. (6/8)	19/4½	19/4½
,, 6% Cum. Pref.	23/9	23/9
United Premier Oil & Cake Co., Ltd. Ord. (5/-)	6/6	6/6
,, 7% Cum. Pref.	23/9	23/9
,, 6% Deb. Red. (£100)	£101	£101

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Sulphuretted Hydrogen

HYDROGEN sulphide for destroying pests is evolved by the action of moisture on shaped and coated balls, tablets, etc., comprising a solid hydrolyzable sulphide and a solid acid constituent. Suitable sulphides are those of sodium, potassium, calcium, barium, strontium and magnesium. Suitable acid substances are sodium or potassium bisulphates or bicarbonates or solid organic acids, *e.g.*, tartaric or oxalic acids. (See Specification 422,856 of A. Carpmael.)

Desulphurising Oil

MINERAL and tar oils are desulphurised by treatment with peracids, containing —O—OH—, *e.g.*, peracetic, perpropionic, and monopersulphuric. Refining by sulphuric acid may also take place. In examples: (1) 500 gm. of Mexican gasolene are shaken for 20-30 minutes with 10.9 gm. of 79 per cent. perpropionic acid, washed with alkali and water, and distilled. (2) 1 kg. of Mexican gasolene is shaken for 60 minutes with 105 gm. of Caro's acid, separated by standing, and washed with diluted alkali and water. (See Specification 424,564, of J. Herzenberg.)

Complete Specifications Open to Public Inspection

POWDERED MATERIAL, method of and apparatus for the distillation.—Magnesium Products, Inc. Jan. 8, 1934. 33311/34.

IRON-SILICON ALLOYS, treatment.—F. Krupp A.-G. Jan. 4, 1934. 33522/34.

NON-CYCLIC ORGANIC COMPOUNDS, production.—Carbide and Carbon Chemicals Corporation. Jan. 5, 1934. 36660/34.

MAGNESIA REFRACTORIES, production.—Harbison-Walker Refractories Co. Jan. 4, 1934. 36872/34.

MINERAL LUBRICATING OILS, production.—Deutsche Gasolin A.-G. Jan. 4, 1934. 37330/34.

HETEROCYCLIC MERCURY COMPOUNDS, manufacture.—Soc. of Chemical Industry in Basle. Jan. 6, 1934. 532/35.

HYDROGENATION OF RUBBER.—E. I. du Pont de Nemours and Co. Jan. 5, 1934. 561/35.

METAL-COATED MATERIALS, manufacture.—E. I. du Pont de Nemours and Co. Jan. 6, 1934. 562/35.

WATER-SOLUBLE BASIC AZO DYESTUFFS, production.—Deutsche Hydrierwerke A.-G. Feb. 7, 1933. 19156/35.

SEPARATION OF AMMONIUM SALTS from their mixtures with other salts.—Soc. D'Etudes Pour la Fabrication et L'Emploi des Engrais Chimiques. Jan. 13, 1934. 23542/34.

VULCANISATION OF RUBBER.—E. I. du Pont de Nemours and Co. Jan. 11, 1934. 34509/34.

POLYMERISATION OF VINYL COMPOUNDS.—Carbide and Carbon Chemicals Corporation. Jan. 9, 1934. 36661/34.

PRODUCTION OF VALUABLE PRODUCTS from coal varieties, tars, mineral oils, and the like.—International Hydrogenation Patents Co., Ltd. Jan. 10, 1934. 37034/34.

PREPARING ALKENES with at least five carbon atoms in the molecule and/or derivatives thereof.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Jan. 10, 1934. 280/35.

COFFEE SUSTITUTES from cereals, production.—E. Jalowetz and M. Hamburg. Jan. 11, 1934. 544/35.

DRY GLUES FROM DEXTRIN, production.—Jagenberg-Werke A.-G. Jan. 11, 1934. 1026/35.

ALGINOUS MATERIAL FROM SEAWEED, recovery.—V. C. E. Le Gloahec and J. R. Herter. Jan. 11, 1934. 1027/35.

ACRIDINIUM COMPOUNDS, manufacture.—I. G. Farbenindustrie. Jan. 13, 1934. 1040/35.

FREE ω-METANE-SULPHONIC ACIDS of pyrazolone-amines, manufacture.—I. G. Farbenindustrie. Jan. 13, 1934. 1215/35.

PRODUCING FAST PRINTS on paper.—Soc. of Chemical Industry in Basle. Jan. 15, 1934. 1217/35.

ALKALI NITRATES, production.—P. Kubelka. Jan. 15, 1934. 1399/35.

SYNTHETIC RESINS and their applications.—E. I. du Pont de Nemours and Co. March 21, 1933. 19654/35.

Specifications Accepted with Date of Application

HYDROCARBON OILS, heating and fractionation.—C. W. Stratford. Jan. 12, 1934. 431,074.

CYCLIC 1-2-AMINO KETONES, method of manufacturing.—P. W. Neber. Feb. 13, 1934. 430,839.

VINYL ETHERS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Feb. 19, 1934. 430,764.

CONCENTRATION OF LATEX.—Rubber Producers Research Association (Rubber Research Institute of Malaya). March 12, 1934. 430,935.

OIL AND SOLVENT RESISTANT MATERIAL, production.—Dunlop Rubber Co., Ltd., D. F. Twiss and A. E. Toney. July 13, 1934. 430,773.

TETRAZOLE DERIVATIVES of the terpene series, production of therapeutically active.—Knoll A.-G. Chemische Fabzriken and K. F. Schmidt. July 22, 1933. 430,774.

SEPARATING SULPHUR FROM GASES containing hydrogen sulphide, process.—Dr. C. Otto and Co., Ges. July 25, 1933. 430,865.

ZINC SULPHIDE and processes of making the same.—American Zinc, Lead and Smelting Co. Sept. 6, 1933. 430,945.

METALLIC POWDERS, manufacture.—E. Kramer. Aug. 9, 1933. 430,777.

QUINONES, *manufacture* and production.—I. G. Farbenindustrie. Oct. 7, 1933. 430,954.

INTERMEDIATE PRODUCTS, manufacture.—Soc. of Chemical Industry in Basle. Oct. 17, 1933. 431,105.

COLD SOLUBLE STARCH PRODUCTS, process of preparing.—Naamlooze Vennootschap Chemische Fabriek Servo and M. D. Rozenbroek. Oct. 23, 1933. 430,872.

CRACKING OF HYDROCARBONS.—W. Lelgemann. Dec. 19, 1933. 430,813-4.

PREPARATION for destroying or preventing rust on cultivated plants.—W. W. Groves (I. G. Farbenindustrie). Nov. 29, 1933. 431,331.

COMPOUNDS CONTAINING METHINE or polymethine chain, production.—J. D. Kendall. Dec. 23, 1933. 431,141.

COLOURED RUBBER PRODUCTS, manufacture.—I. G. Farbenindustrie. Dec. 23, 1932. 431,195.

Applications for Patents

(July 4 to 10 inclusive.)

AZO DYESTUFFS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19607.

COLOURED CONDENSATION PRODUCTS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19608.

POLYMERISATION PRODUCTS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19609.

WATER-SOLUBLE LEUCO COMPOUNDS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19716.

UREA FORMALDEHYDE RESINS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19720.

4.4¹-DI-1-PHENYL-3-METHYL-PYRANO-LONYL, production.—Medico Chemical Corporation of America and I. I. Ostromislencky. 19468.

HYDROCYANIC ACID, recovery.—Rohm and Haas Co. (United States, March 9.) 19226.

HALOGENKYRENEQUINONES and dyestuffs therefrom, manufacture. Soc. of Chemical Industry in Basle. (Switzerland, July 7, '34.) 19528. (Switzerland, June 8.) 19529.

COLOUR LAKES, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, July 10, '34.) 19767. (Switzerland, June 20.) 19768.

SULPHONIUM COMPOUNDS, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, July 10, '34.) 19769. (Switzerland, June 18.) 19770.

ZINC WHITE, production.—Zohn and Co., Ges. (Germany, July 9, '34.) 19221.

(July 11 to 17 inclusive.)

OXYGENATED AROMATIC COMPOUNDS, production.—W. A. Bone, Imperial Chemical Industries, Ltd., and D. M. Newitt. 20205.

POLYVINYL ACETAL RESINS.—Carbide and Carbon Chemicals Corporation. (United States, Aug. 29, '34.) 20347.

STYRENE DERIVATIVES, manufacture.—A. Carpmael (I. G. Farbenindustrie). 19998.

CONCENTRATION OF ACETIC ACID.—M. H. Carpmael (Soc. des Produits Chimiques de Clamecy). 20091.

CHROMABLE AZO DYESTUFFS, manufacture.—Chemical Works, formerly Sandoz. (Switzerland, July 17, '34.) 20272.

AZO DYESTUFFS, manufacture.—Chemical Works, formerly Sandoz. (Switzerland, July 18, '34.) 20409.

ELECTRODEPOSITION OF METALS, apparatus.—C. W. Cheney. 20225.

BUTYL ALCOHOL FERMENTATION PROCESS.—Commercial Solvents Corporation. (United States, July 12, '34.) 20008.

COLOURING AGENTS FOR GLASS BATCHES.—E. I. du Pont de Nemours and Co. (United States, July 18, '34.) 20417.

AQUEOUS EMULSIONS OF CHLORINATED HYDROCARBONS, manufacture.—H. Dodd, Imperial Chemical Industries, Ltd., and S. K. Smith. 20206.

From Week to Week

THE NAME OF TENNANTS (LANCASHIRE-1930), LTD., 1 Booth Street, Manchester, has been changed to Tennants (Lancashire), Ltd.

THE METROPOLITAN-VICKERS ELECTRICAL CO., LTD., announces that both its London office and the offices of its export company are removing from Bush House, and that from August 6 the London office address will be 1 Kingsway, W.C.2. The telegraphic address will be "Multiphase, Estrand, London," and the telephone number will remain unchanged.

IT IS UNDERSTOOD THAT IMPORTANT DEVELOPMENTS in the metal-refining business are likely to arise from the formation of a new company entitled Acid Resisting Metals, of Regent Street, London. This company is taking over the Redheugh foundry at Dunston, near Gateshead-on-Tyne, which has been out of employment for over eleven years, and there it is to exploit six new acid-resisting alloys.

OPENING A NEW FACTORY for the Scottish Milk Powder Co., Ltd., at Kirkcudbright on July 27, Mr. Walter Elliot, the Minister of Agriculture, predicted that next year there will be no wastage of by-products of milk. The Milk Marketing Board, he said, was able to utilise the by-products of manufacture, which previously had run to waste. In one year, under the Board, only 340,000 gallons of skimmed milk had been wasted out of 6,000,000 gallons made at the Board's creameries, and it was anticipated that next year the wastage would be nil.

THE TRANSFER OF MUNITIONS PRODUCTION in part from Woolwich Arsenal to Irvine is foreshadowed by an inquiry from the chief engineer at Woolwich to the Irvine and District Water Board asking if an unlimited supply of water will always be available for the factory at Irvine. Men have been at work on alterations in the factory, which was constructed during the war for the manufacture of T.N.T., and has been standing derelict for 14 years. The factory is in close proximity to the I.C.I. Nobel factory at Ardeer, which is being reorganised.

A NEW JOURNAL OF NATIONAL AND CULTURED SCIENCES, under the title of "Science and Culture," is being published by a group of scientists and educationists in India. The aim of the journal is to further the cause of science, as well as to help in the spread of scientific knowledge amongst the public. It will do its best to secure the maximum possible application of scientific knowledge to the economic and cultural life of the nation, and will be run as a non-profit making concern. The editor is Professor M. N. Saha, of Allahabad University, to whom the Royal Society of Great Britain recently granted £150 towards the cost of his experiments on the thermal ionisation of gases.

THE TREASURY, on the recommendation of the Import Duties Advisory Committee, has issued Additional Import Duties (No. 23) Order, 1935, increasing to £4 per ton, as from August 2, the duty on ammonia liquor, sulphate of ammonia, synthetic sodium nitrate, ammonium sulphate-nitrate, including mixtures of ammonium sulphate and ammonium nitrate, all ammonium phosphates, fertilisers consisting of ammonium nitrate mixed with other materials, and compound fertilisers, mixed with fertilisers and compound manures. The existing rate is 20 per cent. *ad valorem* and average United Kingdom prices for Chilean nitrate and for sulphate of ammonia over the first six months of 1935 were £7 16s. and £7 4.3s. per ton respectively.

THE INSTITUTION OF GAS ENGINEERS has issued its 1935 examination results and the 1935 report of the board of examiners. The awards of diplomas and higher-grade certificates are of particular importance since these, under the Royal Charter and by-laws, are amongst the qualifications required for admission to the Institution. The examinations took place on April 27 and May 4, at the technical colleges throughout the British Isles. The number of candidates examined has increased from 60 in 1924 to 438 in 1935. An increasing number of students are entering the gas industry from the universities and public schools and are qualifying as chartered gas engineers, with a view to occupying technical positions on the manufacturing, distributing and utilisation side of the industry, which has increased its output of gas by 48 per cent. since 1914.

THE SALVATION OF THE COAL INDUSTRY lay with the chemist and not with the politician, declared Mr. Alan Chapman, prospective candidate for Rutherglen, speaking at a garden fete at Bo'ness on July 27. There was growing unanimity on this point, and he believed that the time was ripe for a national campaign to strengthen the hands of the Government in their plans for developing the oil-from-coal industry. Mr. Chapman said he would like to see a short Act of Parliament with two main headings: (1) The conferring of optional powers on local authorities in communities of 5,000 or more to designate certain areas in which only smokeless fuel would be used in domestic hearths; and (2) a definition of a national standard for smokeless fuel giving it a low ash content. He would like to see the Government give a lead by using this fuel in their own buildings, and he would like to see the coal industry planning to meet this increased demand.

THE INTERNATIONAL CONFERENCE FOR SCIENTIFIC MANAGEMENT visited the glass works of Pilkington Bros., at St. Helens, on July 24 and the members were received by the chairman of the company, Mr. G. L. Pilkington. They were shown round both the plate and sheet works. Lord Cozens Hardy, a director of the firm, afterwards addressed them on the firm's experiences of the shorter hours working week.

MORE THAN FIFTY PEOPLE are believed to have lost their lives when the packing department of a large munition factory at Taino, North Italy, blew up on July 27. The factory, which is called the Societa Generale Italiana Explosiva, was formerly controlled by Bickford Smith and Co. It was taken over by the Italian Government only a week or so ago under the new scheme for the organisation of munitions output under a Government Committee.

PRODUCTION OF PETROL AND DIESEL OIL from coal is to start early in September at the new plant erected at Seaham Harbour by Coal and Allied Industries, Ltd. The first unit when in operation will use 500 tons of coal daily, and the daily output will be 10,000 gallons of first-grade petrol; 10,000 gallons of Diesel oil; 200 to 250 tons of coke; and important chemicals for use in the rubber and artificial silk trade; and turpentine substitute. Coal for the plant will be drawn from the Vane Tempest Colliery, Seaham, belonging to Londonderry Collieries, Ltd.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for the addition to the free list of the crude sodium salts of the oil-soluble sulphonic acids formed in the refining of mineral oil and containing not more than 15 per cent. of mineral oil and yielding not less than 60 per cent. of sulphonic acids. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than August 22, 1935.

Prices of Chemical Products

Current Market Conditions

THERE are no price changes to report in the markets for heavy chemicals, rubber chemicals, wood distillation products, coal tar products, perfumery chemicals, essential oils and intermediates. In the pharmaceutical section the price of citric acid has been reduced from 11¾d. to 11½d. per lb. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works. Up to the present no prices for nitrogenous fertilisers for the new season have been announced, but for prompt delivery the prices in force for June continue unchanged.

MANCHESTER.—Quiet trading conditions have been generally reported on the Manchester chemical market during the past week. This, however, is not surprising in view of the fact that we are now pretty well at the height of the holiday season. This has affected operations not only in Manchester itself, but also in a number of outside districts and deliveries of many descriptions of both light and heavy chemicals have been noticeably affected this week. The chemical market on the Manchester Royal Exchange on Tuesday was obviously under the spell of the holidays, although the concluding day of the test match may have accounted for some of the absentees. Under the circumstances new business since last report has been quiet in most departments, and this is likely to continue over the next couple of weeks. In the meantime, prices generally remain steady, with an upward tendency reported in one or two sections.

SCOTLAND.—Business in chemicals for home trade has again been rather quiet during the week on account of the holidays, and export inquiries are also limited. Prices generally continue very firm at about previous figures, several articles being rather dearer, and red lead prices have been increased further £1 per ton.

Apart from the following changes, the prices of chemical products remain as reported in THE CHEMICAL AGE last week (pages 88 and 89).

General Chemicals

ACID, CITRIC.—11½d. per lb., less 5%. MANCHESTER: 11¾d. SCOTLAND: 11¾d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d. to £3 5s.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 6¾d. to 8½d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. per lb.; crude, 2s. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

LAURENCE, SCOTT & ELECTROMOTORS, LTD. (late Laurence, Scott & Co., Ltd.), Norwich. (M.3/8/35.) Reg. July 19, £150,000 (not ex.) series of debs., present issue £120,000; general charge. *Nil. May 9, 1935.

STOCKTON CHEMICAL ENGINEERS & RILEY BOILERS, LTD., Stockton-on-Tees. (M.3/8/35.) Reg. July 19, £3,000 debs., part of amount already reg.

Satisfactions

BLACKWELL'S METALLURGICAL WORKS, LTD., Liverpool. (M.S., 3/8/35.) Satisfaction reg. July 17, of 2nd debs. reg. Dec. 14, 1931, to extent of £700.

DRUG & CHEMICAL CORPORATION, LTD., London, W. (M.S., 3/8/35.) Satisfaction reg. July 19, £559, reg. May 27, 1935.

Bill of Sale

MURRAY, HUMPHREY DESMOND, 9 Elm Place, Onslow Square, S. Kensington, consulting chemist. (B.S. 3/8/35.) Dated July 19; filed July 23. £50.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

HALL CHEMICAL CO. (a firm), 19 Adam Street, Adelphi, W.C., disinfectant manufacturers. (C.C. 3/8/35.) £10 17s. 0d. June 26.

MORGAN DAVIES & SONS, LTD., Pitfield Street, N., manufacturing chemists. (C.C. 3/8/35.) £16 10s. 1d. June 7.

Company News

Davey Paxman and Co.—After depreciation, fees and interest on debenture stock, balance for the year to March 31 is £3,424, less £1,548 to reserve. The amount carried forward is £1,876.

Gas Light and Coke Co.—The half-early payments on the ordinary stock is repeated at £2 16s. per cent. The interim payments on the 4 per cent. consolidated preference stock and 3½ per cent. maximum stock are also announced.

English Velvet and Cord Dyers' Association.—It is announced that consideration of a dividend for the half-year to June 30 last on the 5 per cent. cumulative preference shares and ordinary shares is deferred until the result of trading for the year ending December 31 next has been ascertained. No ordinary dividend has been paid since 1931, when 4 per cent. was distributed. The 5 per cent. preference dividend has been paid to December 31 last.

Broken Hill South.—A dividend of 7½ per cent. and a bonus of 5 per cent. have been declared payable in Melbourne on September 14, making a total of 42½ per cent. for the year. For the year to June 30 a total of 25 per cent. was paid.

Pharmaceutical Products Co.—The profit and loss account shows a trading profit for the year to March 31 last of £6,449, compared with £6,013 the previous year. After interest, depreciation, fees, etc., and writing a sum of £1,000 off preliminary expenses, the carry-forward amounts to £892, against £686 brought in.

Commercial Alcohol Co.—The net profit for 1934 was $930,937, against $1,190,346), equal to $3.57 a share (par $20) on 260,899 shares of common stock, against $4.56; reserve for Federal taxes, $138,000; capital surplus, $2,347,261; earned surplus, $1,508,352; in 1933 gross sales increased from $3,835,322 to $6,731,818, and in 1934 to $29,377,000, of which amount approximately 55 per cent. represented Excise taxes paid to Government.

Shawinigan Water and Power Co.—The payment on common stock for the quarter ended June 30, 1935, of 13 cents will be made on August 15, 1935. The statement for the six months ended June 30 shows gross revenue, $6,276,714 ($5,942,569); operating expenses (including exchange), $2,696,600, including $50,000 reserve for exchange ($2,451,362); net revenue, $3,580,114 ($3,491,207); fixed charges, $2,021,655 ($2,068,593); surplus (before depreciation and income-tax, $1,558,459 ($1,422,614, after cancellation of $150,000, deducted from fixed charges for construction interest in 1934).

New Companies Registered

Durion, Ltd.—Registered July 22. Nominal capital £2,200. To acquire and exploit the exclusive rights for the British Empire in the invention of the late Robert J. Fletcher in a secret process and formula for electro-deposition of heavy chromium and nickel and cleaning of metals, etc., and to adopt an agreement with Ada B. Fletcher. Directors are George N. Biddles, Norman L. S. Hay, Francis Francis, and Valentine H. Baker (chairman). Solicitors: Fladgate & Co., 70 Pall Mall, London, S.W.1.

Imperial Magnesium Corporation, Ltd.—Registered as a private company on July 18. Nominal capital, £200,000. Manufacturers and dealers in magnesium in all its forms (including compounds and alloys) and all metals, minerals and substances employed in connection with the production, manufacture or fabrication thereof, and to carry on the business of miners, chemical manufacturers, metallurgical chemists, etc. A subscriber: Frederick Hopton, 2 Bond Court, Walbrook, London, E.C.4.

Spring Vale Colour Co., Ltd., Springfield Mill, Spring Vale, Darwen.—Registered July 25. Nominal capital £2,000. Manufacturers of and dealers in colours, dyes, chemicals and chemical substances, essences, flavours and essential oils, etc. Directors: Leslie K. Kelly, Charles D. Halliwell and Ernest L. Halliwell.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

France.—An agent established at Lyons wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of asbestos jointing, insulating material, rubber in its industrial application, and non-slipping products for belting. (Ref. No. 116.)

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Egyptian Ministry of the Interior (Municipalities and Local Commissions Section) is calling for tenders, to be presented in Egypt by September 9, 1935, for the supply and erection of three sterilising (chlorine) equipments, automatically regulated, to be connected to delivery piping of high-pressure pumps at the waterworks. (Ref. T.Y. 5132.)

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PATENTS & TRADE MARKS

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PATENTS obtained, trade marks and designs registered, at home and abroad.—GEE AND CO. (Patent and Trade Mark advisers to THE CHEMICAL AGE), 51-52 Chancery Lane, London, W.C.2. Telephone: Holborn 1525. Established 1905.

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